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Improving DLA Aviation Engineering's Support to its Customers and the DoD Supply Chain

K. A. Evans, Project Leader

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**Improving DLA Aviation Engineering's
Support to its Customers and the
DoD Supply Chain**

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Executive Summary

This study, performed by the Institute for Defense Analyses (IDA) for DLA Aviation, focused on identifying improvements that will significantly enhance the engineering support system and its performance. In support of this goal, the study addressed two engineering support functional areas—First Article Testing (FAT) and Technical Data Package (TDP) reviews; assessed the status and leading causes of backorders, a functional area that can be significantly impacted by engineering support; and, included a root-cause analysis of each of the foregoing three areas. Issues and inefficiencies in these three areas individually and collectively are:

- Adversely impacting DLA’s ability to support operational forces and industrial customers with aviation weapon system consumables (repair parts).
- Imposing serious limitations on DoD Supply Chain performance.

The root cause analysis addressed underlying problems that result in under performance in each of the three functional areas and the DLA Engineering Support Activity (ESA) business model.¹ Correcting these problems and restructuring the DLA-ESA business model are prerequisites to significantly improving DoD supply chain performance.

Objective

The primary objective of this assessment was to dramatically improve DLA Aviation’s performance to the operational forces and industrial customers by identifying ways to significantly reduce:

- The number, time, and costs of first article testing and technical data package reviews of aviation items “managed” by DLA Aviation
- Long term backorders of consumable items managed by DLA Aviation, which typically average ~80,000 requisitions at any given time.

Improving performance in these areas will also have a direct and positive impact on DLA’s mission to “Provide efficient and effective worldwide logistics support to the Military Departments and Combatant Commands under conditions of peace and war.”²

¹ DLAI 3200.1 and a series of associated performance based agreements between DLA and the military services’ ESAs.

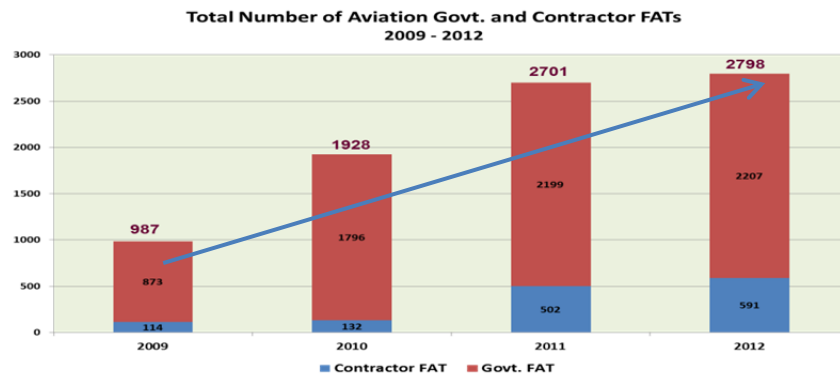
² DoDD 5105.22, *Defense Logistics Agency (DLA)*, dated 17 May 2006.

The Challenges

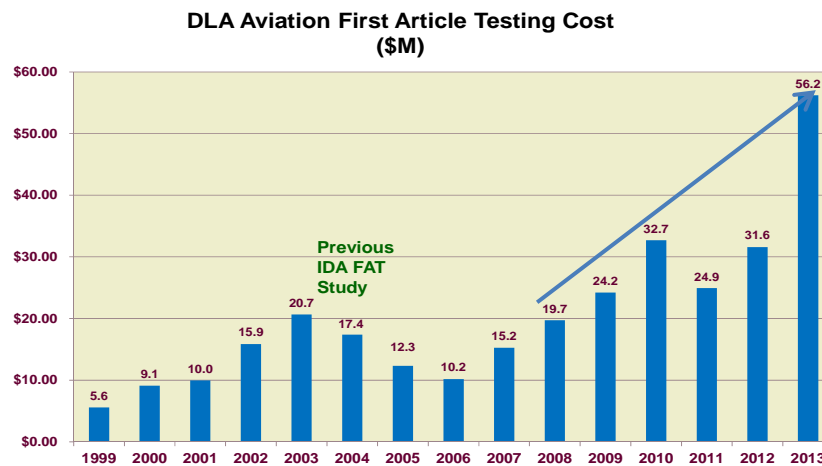
First Article Testing. A FAT is primarily intended to qualify a source, not a product. Federal Acquisition Regulation (FAR) Subpart 9.3, *First Article Testing and Approval*, establishes the general criteria for conducting first article tests and approval. It provides that this type of testing and approval may be appropriate when:

- The contractor has not previously furnished the product to the Government
- The contractor has previously provided the item to the Government, but:
 - There have been subsequent changes in processes or specifications
 - Production has been discontinued for an extended period of time
 - The product acquired under a previous contract has experienced problems.

As shown in the two figures below, the number of Government and contractor FATs nearly tripled from 2009 to 2012; the costs of performing these tests have more than doubled from 2009 to 2013.



**Total Number of DLA Aviation Govt. and Contractor First Article Tests
(FY 2009-2012)**



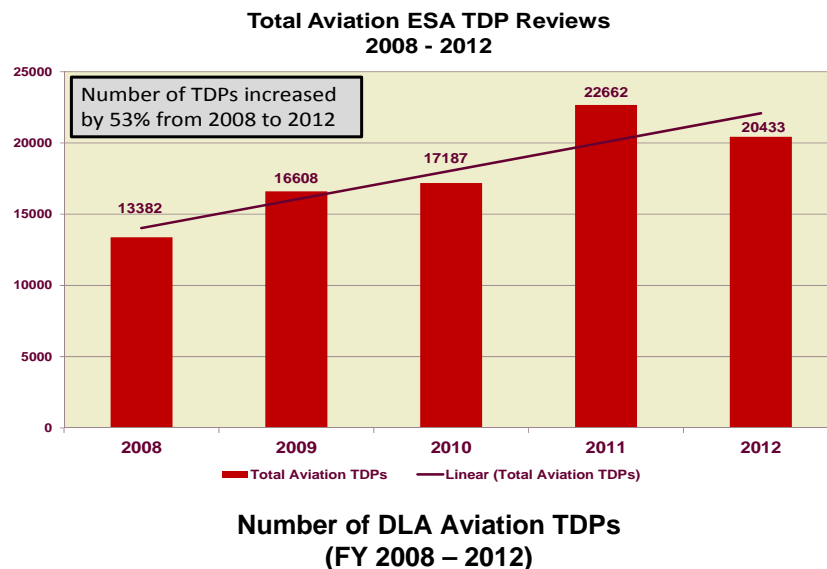
First Article Test Costs (\$M) (FY 1999-2013)

The increase in the number of FATs was fundamentally driven by the military services' ESAs, ostensibly because they are responsible for maintaining configuration control of an item, not DLA Aviation. In this regard it is important to note the following with regard to FATs and the process for determining when they are conducted:

- The rationale provided by the ESAs for performing a FAT is fundamentally based on the policies and procedures contained in the *Joint Engineering Support Instruction*, DLAI 3200.1.
- The provisions of DLAI 3200.1 in this regard are for the most part not consistent with the FAR. This has resulted in a significant number of unnecessary FATs.

TDPs and Reviews. The term “technical data package,” as used in this study, includes all the technical data used as the product description for DLA’s procurement of an item. It essentially includes a technical description of the product (product description) that is required, as well as the technical data necessary to manufacture the item (e.g., drawings).

The figure below shows that the number of TDP reviews conducted increased by more than 50 percent from 2008 to 2012. This increase was fundamentally driven by the policies and procedures in DLAI 3200.1 and the military services' ESAs. Although precise data are not available, it is estimated that the costs of conducting these reviews also increased by more than 20 percent during this period and approximated \$19.7 million in 2012.³



³ This estimate is based on reported engineering support costs that grew from \$21.3 million in 2009 to \$26.3 million in 2012. On average, 75 percent of all engineering support requests are for TDP reviews, which equates to approximately \$19.7 million in 2012.

FATs and TDP Reviews in Perspective. In addition to increasing costs, the current policies and procedures used for first article testing and TDP reviews by DLA Aviation and the military services' ESAs add to procurement lead times and are major contributors to DLA Aviation's long term backorders. In this regard:

- The average production lead time for a FAT exceeds one year, which equates to a significant amount of contract lead time given that almost 2,800 Government- and contractor-conducted FATs were conducted in 2012. Moreover, although the average cost of a first article test decreased significantly from 2009 to 2012, this decrease has been more than offset by increases in the total number of FATs conducted each year.
- A TDP review typically averages 49 days and impacts pre-contract award administrative lead time. More than 20,000 TDP reviews are conducted each year, however, and this in the aggregate accounts for more than one million days in pre-contract award administrative lead times annually.

IDA found several primary causes for the increases in the number and costs of the FATs and TDP reviews that occurred. These include the following:

- The increases in the number of FATs were primarily driven by the military services' ESAs. The reasons for performing the FATs provided by the ESAs, however, often were not consistent with the FAR and detracted from DoD's objective of procuring quality weapon system repair parts in a timely manner.
- DLAI 3200.1's policy and procedures regarding engineering support collaboration between DLA and the military services' ESAs were primary drivers in the increased number of TDP reviews.
- The root-cause analysis revealed that a major factor contributing to all of the foregoing was the lack of an effective and efficient integrated material management (IMM) process that clearly defines the responsibilities and interrelationships among key stakeholders at all levels. In this regard:
 - A strong IMM process, along with the single item manager concept, was a key building block in the consumable item transfer program that was undertaken in the mid-1990s.
 - The intended IMM and single manager concept in reality, however, has only been partially implemented, which has led to decades of confusion and innumerable turf battles between DLA and the military services' ESAs.
- The increases in the number of TDP reviews and FATs, which are time-consuming processes, have contributed to increased procurement lead times and led to increases in the number and length of DLA Aviation backorders.

Backorders. DLA Aviation's approximately 80,000 long term backorders embody the effects of DLA Aviation's extended procurement lead times.

- TDP reviews and FATs are two major contributors to that extended procurement lead time.
- The DLA-ESA business model 3200.1, is inefficient, time consuming, and costly.
- The DLA practice of reimbursing the ESAs for providing engineering support is corrosive; it inhibits the implementation of improved engineering support practices.

Recommendations

IDA's recommendations will enable DLA Aviation to significantly reduce the number, time, and costs for FATs, TDP reviews, and the number of long term backorders. Key recommendations are highlighted below. Appendix C contains consolidated list of all recommendations.

Root-cause recommendations:

- Increase DLA overall responsiveness to customers' needs by more completely implementing the integrated management assigned to DLA by the Secretary of Defense (SECDEF). In support of this:
 - Redraft DoDD 5105.22, *Defense Logistics Agency*, and explicitly include IMM as one of the responsibilities and functions assigned to the Director, DLA for execution.
 - Develop and issue a DoD Instruction (DoDI) that explicitly addresses the responsibilities and interrelationships of key stakeholders with regard to IMM, the joint engineering support system, and the procurement management of depot level repairables (DLRs).
 - Cancel DLAI 3200.1, and reissue as a revised DLA instruction or comparable document that supplements the new DoDI.

First article testing recommendations:

- Cancel DLAI 3200.1 and issue a revised DLA instruction or comparable document that implements the provisions of FAR Subpart 9.3, *First Article Testing and Approval* and requires the use of acquisition strategy codes as a screening tool to eliminate unnecessary FATs.
- Replace reliance on FAT to *test quality into* items; instead, use a quality assurance program that *builds quality into* items.

- Modify the DLA Enterprise Business System so it will automatically remove the FAT-required code from an item in the database when a FAT is satisfactorily completed.

TDP recommendations:

Cancel DLAI 3200.1 and issue a revised DLA instruction or comparable document that provides for the following:

- ESAs shall proactively push TDP changes to DLA Aviation as they occur and not wait for a DLA procurement to initiate a TDP review.
- Acquisition strategy codes Acquisition Method Code/Acquisition Method Suffix Code (AMC/AMSC) shall be used as a screening tool to determine if a TDP review is warranted.
- ESA TDP reviews may be conducted only when a TDP will be used as the product description in a contract and it is determined by DLA that the current TDP is inadequate or not current.
- ESA TDP reviews shall not be conducted for procurements using manufacturers' part numbers or military specifications or standards as the product description.

Backorder recommendations:

- Implement a new contracting strategy that dramatically reduces the number of required contracts while still procuring all needed weapon system repair parts. In support of this new approach:
 - Group a large number of NSNs into a small number of manual contracts for *critical* FSC items commonly backordered
 - Consider weapon-specific technical requirements when grouping NSNs for procurement and management purposes
 - Increase the use of indefinite delivery long term contracts.
- Eliminate unnecessary FATs and restrict TDP reviews to those in which the TDP is used as the product description in a contract.

Impact of Implementing Recommendations

It is estimated that implementing IDA's recommendations contained in this study will enable DLA Aviation to:

- Reduce the number of first article tests (FATs) by 80 percent, which will:
 - Reduce FAT costs by an estimated \$45 million annually

- Reduce cumulative procurement lead times by more than 880,000 days annually
- Reduce the number of TDP reviews by > 37 percent, which will:
 - Reduce TDP review costs by an estimated \$7 million annually
 - Reduce cumulative procurement lead times by more than 360,000 days annually
- Reduce the number of procurements for backordered items by 50 percent, which will reduce cumulative procurement lead times by more than 535,000 days annually.

In summation, the present set of practices embedded in DLA Aviation and the military services' ESAs and the cultures that prevail in these organizations are counterproductive. Fixing the root causes of these problems will require a restructuring of the DoD logistics operating space for consumable item management, procurement, and supply. This restructuring will take considerable effort and require the active support of the Director, DLA and the USD(AT&L).

Post Script

A separate IDA study addressed the business model issue from a DLA perspective.⁴ The study found that, "The business model employed by DLA and the Services' engineering support activities (ESAs) is inefficient, time consuming, and costly." The study also found that, "DLA payments to the ESAs create inappropriate incentives and perpetuate inefficient processes." This resulted in a study recommendation that the "DLA-ESA business model should be reengineered to include ending the DLA funding of the Services' ESA." A replacement model must be built on the principal that DLA's customers are the operational forces and the industrial customers – not the ESAs.

⁴ This study, *The Independent Review of the Roles and Missions of the Defense Logistics Agency*, was performed for OSD was in response to a Congressional requirement.

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1. Introduction

The Institute for Defense Analyses (IDA) conducted this assessment in support of Director of Aviation Engineering, Defense Logistics Agency (DLA). This study is the latest of a number of studies by IDA for DLA Aviation and Headquarters DLA over the past 16 years. In addition to assessments and other analytical projects and reports, IDA has written a number of training guides used by DLA, including a DLA Training Center course on the Joint Engineering Support System.

A. Purpose and Objective

The purpose of the current IDA assessments was to provide DLA Aviation with recommendations on how to significantly improve the efficiency and effectiveness of the first article testing, technical data package (TDP), and backorder processes. In addition, IDA was to identify the root cause of problems in these areas as they are causing significant adverse effects on procurement lead times and are rapidly increasing costs. This prior research provided a sound analytical foundation for this study.

The specific objective of the four current analyses and assessments, as included in IDA's task order and supplemented by verbal instructions from the sponsor, was to develop recommendations on how to significantly reduce the time, cost, and adverse effects of first article testing (FAT) and TDP engineering support reviews; and reduce the number and length of time of DLA Aviation's backorders caused by TDP and FAT processes.

B. Background

DLA Aviation has experienced an increase in the number and costs of FATs and TDP engineering reviews over the past several years. These two processes are primarily a technical-quality responsibility. An increase in first article testing and TDP engineering reviews increases procurement lead times. Increased lead times increase the number and length of DLA Aviation backorders, which reduces DLA Aviation's responsiveness in filling orders for DLA-managed consumable items. The large numbers of long term backorders are very important in that they can have a major impact on weapon system materiel readiness.

Based on the above, the Director, DLA Aviation Engineering asked IDA to perform analyses and assessments and make recommendations on how to mitigate the adverse effects of these trends. DLA Aviation realized that the recommendations from this study

would also support the DLA Director's Time-to-Award initiative. The purpose of this high priority initiative is to reduce the time required to award DLA contracts and thereby improve DLA's responsiveness to, and the materiel readiness of, DLA's customers. IDA coordinated with the SES manager of this initiative and was able to provide a great deal of detailed and useful information from our assessments.

IDA was selected to perform this assessment based on previous work performed for DLA on relevant topics including:

- Improving DLA's Joint Engineering Support System
- First Article Testing
- Critical Safety Item Management
- Critical Application Items
- Training materials for DLA's technical-quality personnel.

C. Research Approach and Data Sources

In order to assess the topics of interest it was necessary to access not only data from DLA's Enterprise Business System (EBS), but also engineering support data, first article testing data, DLA Aviation procurement data, and backorder data. IDA developed a data collection plan describing what data elements were needed. All the data requested were provided by DLA Aviation's Business Process directorate, DLA Aviation Engineering personnel, and DLA's Operations Research and Resources Agency (DORRA).

D. Scope and Limitations

The scope of these assessments was primarily limited to DLA Aviation. However, it was recognized that the assessment would also be relevant for all of DLA's supply centers since the technical and quality policy, procedures, and practices used at DLA Aviation are common throughout DLA.

The limitations of this assessment include:

- Critical safety items (CSIs) were not addressed in depth; however, IDA recommended that current CSI policies, procedures, and practices should not be changed.
- Data analyzed were limited to data for DLA Aviation managed items.
- Most of the engineering and procurement data used were for the period January 2009 through June 2013. However, IDA did receive some data through 2013, e.g., cost data.

- IDA's analyses, assessments, and recommendations **were not constrained** by current DLA policies and practices in the search for significant savings. The impact of operating in this unconstrained manner resulted in all of IDA's major recommendations conflicting with DLAI 3200.1, *Joint Engineering Support Instruction* guidance.

E. Organization of the Report

This chapter provides an introduction to the task. Chapter 2 provides a description of each of the four main assessment areas covered in Chapters 3 through 6. For each of the four areas a succinct description of key elements of the analysis, findings, conclusions, and recommendations included in the individual chapters are provided.

The sequencing of the chapters is relevant. Chapter 3 contains the root-cause analysis. The root-cause analysis addressed the underlying problems that result in under performance in each of the other three functional areas. The root-cause recommendations, in turn, addressed structural changes needed to improve performance in each of the three functional areas and also in the DLA-ESA business model.¹ As such, this chapter sets the stage for the following chapters. Chapters 4 and 5 address first article testing and technical data packages. These two functional areas reside entirely within the engineering support domain. Significant improvements in these two functional areas are dependent upon the implementation of the root-cause recommendations. Chapter 6 addresses backorders, which does not fall within the engineering support domain. However, significant improvements in reducing the number of long term backorders is highly dependent upon making significant improvements in the first article testing and technical data package functional areas. In turn, significant improvements in those two functional areas are dependent upon eliminating the root-cause problems discussed in Chapter 3.

Chapters 3 through 6 each contain in depth analyses, assessments, and conclusions. The conclusions were used to develop a comprehensive set of recommendations. Appendixes A and B contain extracts from the DMRD 926 approval memorandum and the DMRD 926 study, respectively. Appendix C contains a consolidated list of all of the study recommendations. Appendixes D – F contain supporting material; list of illustrations; references; and acronyms.

¹ The DLA-ESA business model is primarily set forth in DLAI 3200.1 and a series of performance based agreements with the military services.

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2. Assessment

This chapter summarizes the four major areas addressed in this study. In addition to briefly describing each area, it highlights the key elements of the analyses conducted and the key findings, conclusions, and recommendations for each area.

A. Root-Cause Analysis

The task order required the IDA to perform a root-cause analysis for two functional areas: backorders and first article tests. IDA, with the consent of the sponsor, elected to include technical data package (TDP) reviews as a third functional area in the root-cause analysis because it impacts backorders and overall supply chain performance.

1. Overview

The following two overarching problem statements were analyzed to identify their root causes:

- DLA Aviation has been and still is experiencing extensive procurement lead times when contracting for consumable items, including repair parts for DOD weapon systems.
- DLA Aviation also has been and still is experiencing a very large number of backorders.

These two statements were systematically and sequentially analyzed to determine the most significant factors that contributed to long procurement lead times and the extensive number of long term backorders (those that exceeded 180 days) that were experienced and exist today. This process of discovery, i.e., systematically and sequentially dissecting select logistics processes, was continued until the root causes of these two complex problems were ascertained.

The analysis revealed that the immediate cause or driver of long procurement lead times and large numbers of backorders was the DLA Aviation stockage and non-stockage posture. Five analyses were performed before arriving at these root causes. These analyses focused on the following areas and were conducted in the order listed below.

- Stockage and non-stockage posture
- Manual and automated procurement times
- Manual and automated contracting

- Technical-quality considerations (first article testing, technical data package reviews, engineering support requests)
- Critical application item (CAI) process.

Some of the insights gained regarding DLA Aviation's stockage and non-stockage posture include the following:

- Twenty-one percent of DLA Aviation's items are stocked items and 79 percent are non-stocked items.
- Since stocked items are usually available for issue on demand, it was determined that they were not a primary contributor to backorders and that any delays in procurement lead times for them probably would not significantly impact DLA Aviation customers.
- IDA determined that demands for non-stocked items essentially drive backorders and customer wait times.

The root-cause analysis methodology employed and the insights obtained in each area regarding their effect on procurement lead times and backorder are discussed in Chapter 3. The overall results obtained by integrating the results of the five root-cause analyses are highlighted below.

2. Root-Cause Assessment

IDA integrated the results of the individual analyses and identified two root-causes for procurement delays and large numbers of backorders. Four factors that contributed to extended procurement times and large numbers of backorders were also identified.

The *two root causes* identified were:

- *Existing integrated materiel management practices are too restrictive and are hampering the effectiveness and timely completion of essential management review processes.*
- *Cultural problems exist at the DLA working level and are hampering DLA Aviation's ability to respond effectively and efficiently to the needs of the customer base.*

It was also determined that four factors contributed to the procurement delays and backorder problems of DLA Aviation. These contributing factors are:

- Key provisions of the Federal Acquisition Regulation (FAR) are not being followed or enforced.
- DLA's procurement practices are not fully supportive of customer needs.

- OSD policies and guidance for conducting integrated materiel management and effective engineering support are lacking.
- DLA funding practice of reimbursing the ESAs for providing engineering support encourages some ESAs to place additional requirements upon DLA, e.g., more testing. (A current IDA study for the USD (AT&L), *The Independent Review of the Roles and Missions of the Defense Logistics Agency*, and a CY 2007 IDA study of the DLA-ESA engineering support system both concluded that the practice of paying the ESAs to provide engineering support detracts from the efficient and effective operation of the DLA-ESA business model.)

The significance of the two root causes cannot be overstated; their influence is wide spread. They adversely impact performance of both the technical-quality and the procurement functional areas and have a negative impact on DLA Aviation's customers. In this regard, current practices can be characterized as decentralized management, lack of full compliance with the FAR, excessive procurement lead times, and increased costs burden for the Services' operational forces and industrial customers. Eliminating these root causes would enable the engineering support system and these two functional areas to operate more effectively and efficiently. Although this would not totally eliminate all backorders, it has the potential to significantly reduce the number DLA Aviation is experiencing, especially long term backorders. The potential to improve overall performance could also be markedly enhanced by addressing the four other contributing factors to the backorder problem statements.

3. Conclusion

The origin of DLA's inability to implement effective integrated materiel management practices can be traced back to the Inventory Control Point Consolidation Study Report that was implemented in DMRD 926 more than 20 years ago; the DLA cultural problem at the working level extends back at least to 2000.

In sum, the present set of practices is firmly embedded in both DLA and the military services' engineering support activities. Fixing these two root-cause problems, therefore, will essentially require a restructuring of the DoD logistics operating space for consumable item management, procurement, and supply. This restructuring will take considerable effort and require, as a minimum, the active support of the Director, DLA and the USD (AT&L).¹

¹ The significance of the two root causes identified cannot be overstated. The influences of these root causes are widespread, systemic, structural, and cross-cutting in that they affect all the areas in this study (FAT, TDP reviews, and backorders). In order to effect lasting improvements in FAT, TDP reviews, or backorders it is imperative that the root causes identified be addressed as part of any engineering support system reform and effort be undertaken to meet the objectives of reducing the

4. Recommendations

The key recommendations for the root-cause analysis area are as follows:

- **Recommendation 1.** DoDD 5105.22, *Defense Logistics Agency*, should be revised to explicitly include Integrated Materiel Management (IMM) as one of the primary functions and responsibilities of the Director, DLA.
- **Recommendation 2.** DUSD (L&MR) should develop and issue a DoDI that addresses IMM, the joint engineering support system, and the procurement management of Depot Level Repairables (DLRs).
- **Recommendation 3.** The FAR guidance regarding technical-quality operations, particularly first article tests, should become the cornerstone of DLA operating policies and procedures.
- **Recommendation 4.** DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled and not reissued.

B. First Article Testing

The objectives of the FAT assessment were twofold:

- To dramatically improve DLA Aviation's customer support by identifying ways to significantly reduce the number, time, and costs of first article testing, while improving the quality of items that DLA Aviation procures.
- To reduce long term backorders of consumable items managed by DLA Aviation that average about 80,000 requisitions at any given time. Improving DLA's performance in this area is extremely important as FAT is a primary contributor to long term backorders.

1. Analysis of First Article Testing

The objective of the various first article test analyses that were conducted was to characterize the utility of FAT as an engineering support operation and assess its impact on DoD supply chain operations. To accomplish this objective, 13 independent analyses were performed.

These FAT analyses included identifying and reviewing key policy documents to determine what the FAT policies were and determining if the FAT and engineering support policies in these documents were consistent with federal procurement policies. The analyses also identified the rationale for conducting FATs and their cost, and

number, costs, time, and adverse impacts on procurement lead times associated with FATs, TDP reviews, and backorders.

assessed the impact of FATs on procurement lead times. Acquisition strategy codes (AMC/AMSC) for procurements were also analyzed to determine if the FATs conducted were appropriate.

The results of these analyses are discussed in detail in Chapter 4. Two examples of the FAT analyses results and insights gained are highlighted below.

- FATs are currently required for about 32,000 DLA Aviation items. Figure 2-1 provides a breakout of the number of items that require a FAT by military service. The Air Force is the predominant driver and accounts for more than 55 percent of first article testing requirements. Moreover, it should be noted that DLA prorates the cost of all first article testing across all weapon system consumable items. This in effect means that the operating forces of the other military services are paying for (or subsidizing) a substantial portion of the cost of Air Force required FATs.

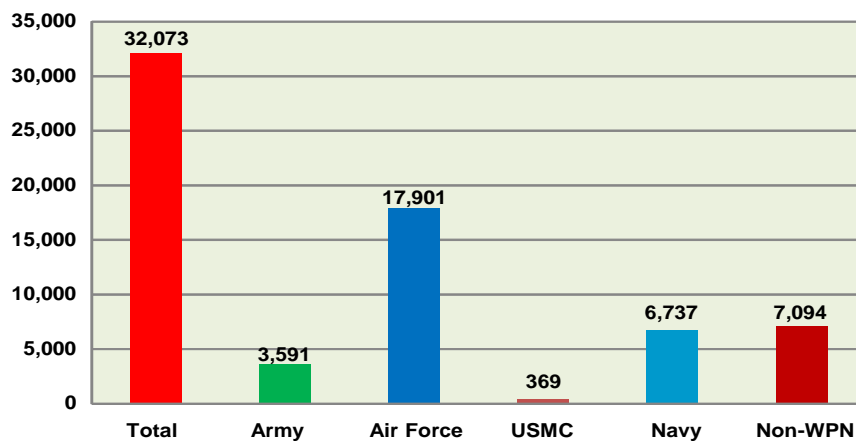


Figure 2-1. First Article Test Coded NSNs by Military Service

- The number and costs of FAT were also analyzed over time. Both increased considerably as shown in Figures 2-2 and 2-3, respectively. From 2008 to 2012, the number of FATs performed increased 186 percent. DLA Aviation FAT costs increased 133 percent from 2009 to 2013 and totaled \$56.2 million in 2013.

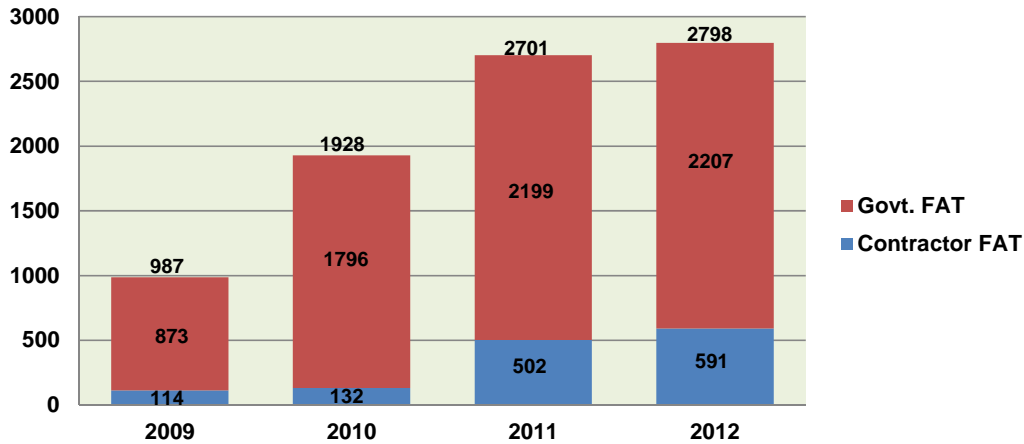


Figure 2-2. Number of DLA Aviation Govt. & Contractor First Article Tests, FY2009-2012

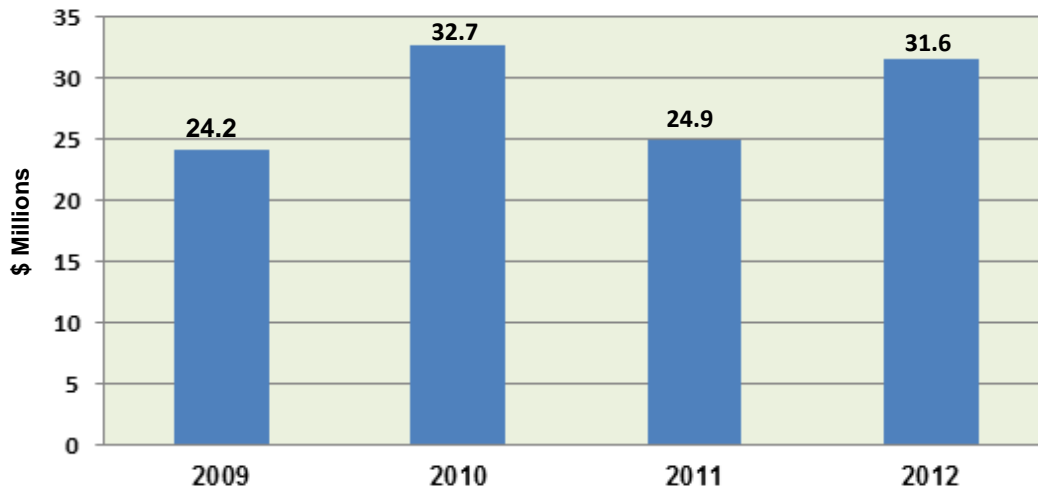


Figure 2-3. First Article Test Costs (\$M), FY2009-2013

2. FAT Assessment

The collective results of the 13 analyses led to a number of key findings. These findings were categorized into the three areas discussed below.

- FAT Performance.** FATs, in general, have had a significant negative impact on procurement lead times because the start of manufacture is delayed until all testing is satisfactorily completed; the average production lead time is typically about 390 days when a FAT is conducted. Thus, the FAT process essentially added almost 1 million days (2,931 years) to DLA Aviation annual procurement lead times in 2011 and a slightly larger amount in 2012.
 - The longer procurement lead times experienced as a result of the FAT process essentially:

- Are translated into longer wait times for the military services' operational forces and industrial (depot) customers whose normal activity cycle times are far shorter
 - Tend to drive up required stockage levels for stocked items, thereby increasing DLA Aviation stockage costs.
- The costs of these FATs, which totaled more than \$56 million dollars in 2013, are also passed on to the military services through DLA's cost recovery rates (surcharges). Financially, the ESAs reap the benefits of more testing.
- **Federal Acquisition Regulation Approach to FAT.** The FAR prescribes the conditions under which a FAT is appropriate. Those provisions are largely not being observed. In fact, the analysis of the FAR indicates that the number of FATs could be reduced by about 80 percent if the FAR provisions were fully implemented. This, in turn, would significantly reduce procurement lead times and customer wait times, reduce FAT costs, and decrease the number of DLA Aviation long term backorders.
- **Current approach to FAT.** Most DLA Aviation first article testing is initiated as a result of the items' FAT coding. As noted previously, the military services have coded some 32,000 DLA Aviation items as requiring a FAT.
- The FAR states that the primary purpose of first article testing is to determine *if suppliers are qualified to produce particular items*. The current DLA Aviation process, by contrast, essentially ties first article testing to items instead of suppliers. This essentially means that even qualified suppliers are subject to FAT contract requirements unless they are granted a waiver by the cognizant military service ESA. The analysis and assessment of current FAT practices suggest that the military services are trying to use FAT as a means to assure the quality of critical items.
 - This is tantamount to trying to *test quality into items*, which is in conflict with modern quality assurance principles.
 - IDA's assessment shows that vast improvements can be made by focusing on a *build quality in* approach to quality assurance that is based on modern quality assurance principles and the provisions of the FAR.

3. FAT Conclusion

The number of first article tests conducted increased significantly from 2009 to 2012. Current practices, however, which are quite time consuming have often yielded questionable results and resulted in an almost 40 percent first article test failure rate; the

foregoing has unfortunately further contributed to increasing numbers of long term backorders and even longer procurement lead times.

There is a better and faster way to realize the Government's objective of procuring quality products. The better way is to *build in quality*. This approach to procuring quality products is fully compatible with the FAR, the DFARS, and DoDD 5105.22 guidance. With respect to Government contracts, a *build in quality* strategy minimizes the need for the Government and contractors to perform "after the fact" inspections, and relies on the contractors to control and efficiently manage their manufacturing process. That is, contractors, not the Government, are responsible to *build quality into* their products. The details of this approach are described in Chapter 4.

4. FAT Recommendations

The following recommendations will enable DLA Aviation to reduce the number, cost, and adverse impact of the current FAT process on procurement lead times:

Recommendation 1: The first article test program should conform to FAR Subpart 9.3, *First Article Testing and Approval* and DTM 13-007, *DLA First Article Requirements and Process Management*. This will significantly reduce the number of first article tests being performed.

Recommendation 2: Implement an aggressive quality control program that conforms to FAR Subpart 46.2, *Contract Quality Requirements*.

Recommendation 3: Implement a more comprehensive Government Contract Quality Assurance (GCQA) program for critical items. This GCQA program should conform to the provisions of FAR Subpart 46.4, *Government Contract Quality Assurance*, and DFARS Subpart 246.4, *Government Contract Quality Assurance*.

IDA estimates that implementing the foregoing recommendations, which will essentially change the current approach to quality assurance for items requiring a FAT, will reduce the number of first article tests by 80 percent per year and enable FAT costs to be reduced proportionately. Most importantly, implementing the recommendations and reducing the number of FATs will reduce cumulative procurement lead times by more than 850,000 days annually and increase the likelihood that DLA procures quality products. It will also facilitate reductions in long term backorders and markedly improve DLA Aviation's responsiveness to the needs of its customers.

C. Technical Data Package Reviews

DLA provides potential suppliers with a technical description of the product (product description) it is interested in procuring. This includes the technical data necessary to manufacture the item, such as drawings. Thus, the term *technical data*

package (TDP) as it is used in this study refers to all the technical data used as the product description for DLA's procurement of an item.

The adverse effects that TDP reviews are having on aviation supply chain performance and customer support operations is a major concern of DLA Aviation. Accordingly, the objective of the TDP assessment portion of this study focused on identifying and exploring ways to significantly reduce the number, time, and costs of TDP reviews, which occur when DLA Aviation sends a request for TDP engineering support to a military service ESA. The reviews, which are conducted in accordance with the policies and procedures contained in DLAI 3200.1, are ostensibly intended to ensure that the TDP used by DLA in a product description is technically accurate, current, and complete.

1. TDP Analyses

IDA used quantitative data from various parts of DLA's Enterprise Business System (EBS) to support the TDP analysis, which is described in detail in Chapter 5.

In addition to analyzing available quantitative data, TDP information was obtained by analyzing relevant DoD, DLA, and DLA Aviation policies and procedures. Additionally, IDA interviewed a number of DLA Aviation personnel, including those in the Product Data Management Division, Business Process Division, Aviation Engineering, and various profit centers where technical/quality product specialists are assigned. The interviews were useful in understanding how the current TDP process actually works at DLA Aviation and why ESA TDP reviews are being requested.

A number of analyses were performed to determine the scope and magnitude of the problems described to IDA by DLA Aviation personnel. The analyses performed included but were not limited to the following areas:

- The uses of technical data and the responsibilities for maintaining and keeping it current.
- The number of TDP reviews conducted and rationale for them; the acquisition strategy codes (AMC/AMSC) that pertained to each item; and the estimated costs of these reviews with regard to total engineering support costs.
- The current requirements for conducting TDP reviews and the differences in TDP review procedures, if any, among the military services.
- The effect of TDP reviews on procurement lead times and contract award times.

The data used to support these reviews included more than 5 years of DLA Aviation procurement, engineering support, and cost data. The analyses revealed the following:

- TDP reviews were driven by the policies and procedures contained in DLAI 3200.1, *Joint Engineering Support Instruction* and various associated performance-based agreements with the military services. In this regard:
 - The requirement to conduct a TDP review is calendar date driven and based on the time elapsed since the last review. This practice ignores the primary reason for DLA to request a TDP review, which is to ensure the TDP that DLA intends to use as a product description in a contract is technically accurate, current, and complete.
 - The military services are responsible for maintaining current technical data on their weapon systems and configuration control.
 - The military services, however, do not normally proactively notify DLA of changes to technical data or “push” technical data changes to DLA. Instead, the military service ESAs wait for DLA to request a TDP review and either update essential information or confirm that no changes are required.
- The number of TDP reviews conducted by DLA Aviation increased 54 percent from 2008 to 2012 and the rate of growth has increased since the implementation of the current DLAI 3200.1 in October 2010.
- Total costs for engineering support at DLA Aviation increased 54 percent from 2009 to 2012. ESA TDP reviews also account for more than 75 percent of all DLA Aviation engineering support requests, and probably account for about 75 percent of DLA Aviation’s engineering support costs. TDP reviews normally occur at DLA Aviation as an integral part of the procurement process, which delays the procurement process and adds to pre-contract award lead times. The average procurement lead time is increased by 49 days for items requiring a TDP review. The annual cumulative effect on procurement lead times for ~20,433 TDP reviews is ~1,001,217 days (2,740 years).
- Finally, an analysis of the acquisition strategies used for procurements that included an ESA TDP review revealed that more than 37 percent of the acquisition strategies did not warrant the use of a TDP as a product description.

2. TDP Assessment

Current policy and procedures require DLA Aviation to request Service ESA reviews of technical data based solely on the criticality of the item, the calendar time elapsed since the last TDP review, and the weapon system designator code. This is not a sound approach and results in many unnecessary TDP reviews. For example:

- A review of the acquisition strategy codes (AMC/AMSC) used in procurements, for which an ESA TDP review was performed, revealed that 37 percent had

acquisition strategies that did not require the use of a TDP as the product description.

- The review also revealed that ESA TDP reviews were performed for non-competitive procurement contract types and procurements that used a manufacturer's part number as the product description.

In sum, the policies and procedures process governing the need for a TDP review must of necessity ensure that the technical data DLA intends to use as the product description in a contract is accurate, current, and complete.

The vast majority of items procured by DLA for the Services have stable designs. This is one of the screening criteria used before transferring items to DLA. Therefore, changes to technical data that affect form, fit, function, interface, or the ability of a contractor to produce an item that meets requirements do not occur frequently for a given item. However, when they do occur, DLA Aviation needs to be notified prior to the next procurement so as not to delay contract award.

3. TDP Conclusions

The assessment of the TDP data, policy, and procedures leads IDA to conclude that it is feasible to reduce the number, cost, and time of TDP reviews and ensure that TDPs are accurate, current, and complete and can be used as product descriptions when appropriate. In this regard:

- It is clear that the policy and procedures included in DLAI 3200.1, *Joint Engineering Support Instruction (JESI)*, and the performance-based agreements (PBAs) between DLA and the Services need to be event based and not calendar date based. The events that trigger the need to update and/or review a TDP should include form, fit, function, or interface changes, and other changes that would effectively inhibit using the existing TDP as a product description in DLA contractual documents.
- The process employed to accomplish the foregoing should require that the military service ESAs notify DLA whenever a TDP needs to be updated or reviewed. It should also require that the ESAs either expeditiously push the updated TDP data to DLA or grant DLA access to the ESA TDP database repository.
- The approach described above will result in far fewer ESA TDP reviews, reduce DLA procurement lead times, and increase DLA Aviation's responsiveness to its customer needs. It may, however, take some time to fully implement the changes envisioned. In the interim, IDA suggests the following policy and practices be adopted:

- DLA should consider requesting ESA TDP reviews only for procurement actions in which a TDP is used as the product description and there is reason to believe that the TDP has changed. DLA Aviation has access to Service technical data repositories and can thereby determine if top level drawings or other key technical data have changed. If no changes are evident in a Service's technical data repository, that should be sufficient for DLA to proceed with the procurement without an ESA TDP review.
- For TDPs that have not changed, regardless of the time since the last review and regardless of the item's criticality or weapon system status, the TDP should be considered useable as the product description absent a compelling reason not to do so and no ESA TDP review should be conducted.
- For items being procured using a military specification or standard or part number as the product description, DLA should not request engineering support for a TDP review. In these cases, the acquisition strategy codes (AMC/AMSC) can serve as a template to determine when it is appropriate to use a TDP as a product description in DLA procurement actions.

4. TDP Recommendations

Recommendation 1. The ESAs should “push” technical data changes to DLA as they occur.

Recommendation 2. DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled and the TDP recommendations entirely reengineered to reflect the TDP recommendations herein.

- TDP reviews should be based on the key event that warrants a review—an actual change to the TDP that affects form, fit, function, or interface.

Recommendation 3. Recommendation 1 will likely take a period of time to implement. In the interim, DLA Aviation should request ESA TDP reviews only when it is clear that the procurement acquisition strategy, as indicated by the acquisition strategy code, is suitable for using a TDP as the product description.

Recommendation 4. Do not require ESA TDP reviews for procurements when:

- Using a manufacturer's part number as a product description
- Using military specifications or standards as the product description.

Recommendation 5. The Services should maintain transparency of technical data for DLA.

- The Services maintain technical data repositories for the storage of TDPs. DLA should have access to all military service technical repositories.

- DLA's access to technical data repositories should be all that is required to assure DLA that they are using the latest technical data, thus eliminating the need for unnecessary ESA TDP reviews.

IDA estimates that implementing the above recommendations will result in an initial 37-percent reduction in TDP reviews, with a greater reduction to follow as the military service ESAs push TDP changes to DLA Aviation. Moreover, this initial reduction in TDP reviews will reduce DLA Aviation annual cumulative procurement lead times by slightly more than 360,000 days and enable DLA Aviation to save about \$7 million annually.

D. Backorders

Manually processed contracting actions are a major contributor to customer wait times and consequently to backorders. Correspondingly, the time required to perform technical-quality operations is a major contributor, if not the largest contributor, to the administrative lead times associated with customer wait times and backorders.

Accordingly, the basic thrust of this portion of the study effort and assessment focused on exploring ways of reducing the adverse impact that manually processed requisitions and technical-quality operations are having on backorders.

1. Backorder Analysis

The backorder analyses focused on DLA Aviation's long term backorders, which are defined as backorders that are at least 180 days old.

Two approaches were used to determine if the costs and procurement times associated with backorders and the costs and administrative lead times required to process procurement instruments could be significantly reduced.

- The first approach focused on exploring ways to reduce the number of manual procurements needed to satisfy DLA Aviation Supply Chain requirements.
- The second approach sought to identify policy and procedural changes that will permit manual procurements to be processed more expeditiously.

IDA developed and tested the following hypothesis on how to reduce the total number of manual contracts.

The number of long term backorders associated with non-stockage consumable items can be dramatically lowered by grouping, for procurement, National Stock Numbers (NSNs) assigned to critical Federal Supply Classes (FSCs).

The term *critical FSCs* is used to denote a set of FSCs that collectively contains in excess of 50 percent of the current and past long term backorders for non-stockage consumable NSNs. The testing of the hypothesis demonstrated that:

- There is in fact a small critical set of FSCs that possesses a sufficient number of long term *and recurring* backorders to justify grouping these NSNs for procurement purposes.
- This same small critical set of FSCs remains relatively unchanged over a several year period.

The analyses on the potential impact of grouping a large number of procurement actions by FSC indicated that:

- The administrative lead time (ALT) for a grouped set of NSNs will be significantly less than the collective ALTs if those NSNs were individually procured (i.e., they were not grouped together for procurement).
- Grouping NSNs assigned to a single FSC for procurement is compatible with the industrial base supporting that FSC (i.e., contractors and suppliers that are capable of supplying the grouped items are available).

The results of the assessments, conclusions, and the recommendations made in this regard are contained in Chapter 6 and highlighted below.

2. Backorder Assessment

The purpose of the analyses was to determine if it were possible using historical data to find a small set of holistic characteristics – critical characteristics – common to a large number of backorders that will permit subsequent demands for those items to be collectively managed in a way that will reduce the impact of future backorders.

The results of the evaluation showed that DLA Aviation's long term backorders were associated with 4,815 NSNs and that 2,715 of those NSNs belonged to one of 13 critical FSCs; said differently, 57 percent of DLA Aviation's long term backordered NSNs are associated with 13 critical FSCs. The analysis also indicated that the critical FSCs identified were relatively stable for the past 2.5 years.

In summary, the hypothesis was validated. To apply this hypothesis to future procurement actions, the long term backordered NSNs associated with the 13 critical FSCs should be grouped by FSC. Each group should consist of approximately 10-20 NSNs in order to be manageable. Further, each group should also employ an indefinite delivery – indefinite quantity type of contract approach.

3. Backorder Conclusions

The approach taken to satisfy the need to significantly reduce both the costs and procurement times associated with backorders and the costs and administrative lead times that are required to process manual procurements focused on:

- Reducing the total number of manual procurements required to satisfy DLA Aviation Supply Chain requirements
- Identifying policy and procedure changes that will permit manual procurements to be processed more expeditiously.

The analyses and assessments led IDA to conclude the following:

- Significant time and cost savings – and improved customer support – can be realized by reducing the number of manual contracts processed by DLA Aviation. To accomplish this, DLA Aviation should group selected NSNs by their FSC and procure them using long term indefinite delivery type contracts.
- The technical-quality processing times associated with manual procurements can be significantly reduced by:
 - Restructuring the critical application item process to include the use of Federal Logistics Information System (FLIS) criticality codes (Chapter 3)
 - Dramatically reducing the number of FATs performed (Chapter 4)
 - Significantly reducing the number of TDP reviews (Chapter 5).

In order to realize these cost and time savings it will first be necessary to replace DLAI 3200.1, *Joint Engineering Support Instruction*, with a new more customer focused DoDI that includes the spirit and intent of the study and the recommendations below.²

4. Backorder Recommendations

Recommendation 1. DLA Aviation should implement a contracting strategy based upon *critical* FSCs. This strategy should:

- Employ a small number of contracts to procure a significant number of NSNs assigned to each *critical* FSC. Selected NSNs assigned to *critical* FSCs should be grouped for procurement and management purposes.

² DLAI 3200.1's decentralized management construct and restrictive procurement practices require Engineering Support Activity approval for each of the following contractual actions: (1) insertion of Contract *Quality* Requirements, (2) insertion of testing requirements, and (3) waiver of first article testing or production lot testing. A similar situation exists regarding technical data packages. DLAI 3200.1 requires TDP reviews be performed in accordance with the military services' requirements.

- Consider weapon-specific technical requirements when determining NSN grouping for procurements.
- Increase the use of indefinite delivery type long term contracts.

Recommendation 2. The contracting strategy goal should be one contract for every 20 unfilled order requisitions for those selected NSNs assigned to *critical* FSCs.

Supporting Recommendations

- Implement the study recommendations made for Critical Application Items (Chapter 3), First Article Testing (Chapter 4), and TDP Reviews (Chapter 5).

IDA estimates that implementing these recommendations will enable DLA Aviation to reduce the number of manual contracts by approximately 85 percent and significantly reduce the number and average age of long term backorders.

3. Root-Cause Analysis

A. Identifying Underlying Causes for FAT, TDP, and Backorder Problems

The task order required IDA to perform a root-cause analysis for two of the assigned engineering support functional areas: backorders and first article tests. IDA elected to include TDP reviews as a third functional area since it is very closely related to the other two. The following engineering support oriented root-cause analysis will simultaneously address all three areas. The basis for combining the three root-cause analyses stems from the three functional areas being greatly influenced by the policies and practices of the Joint DLA-military services engineering support system as set forth in DLAI 3200.1.

B. Root-Cause Analysis Problem Statements

1. Problem Statements

The two root-cause problem statements, which will be analyzed to identify their root causes, are:

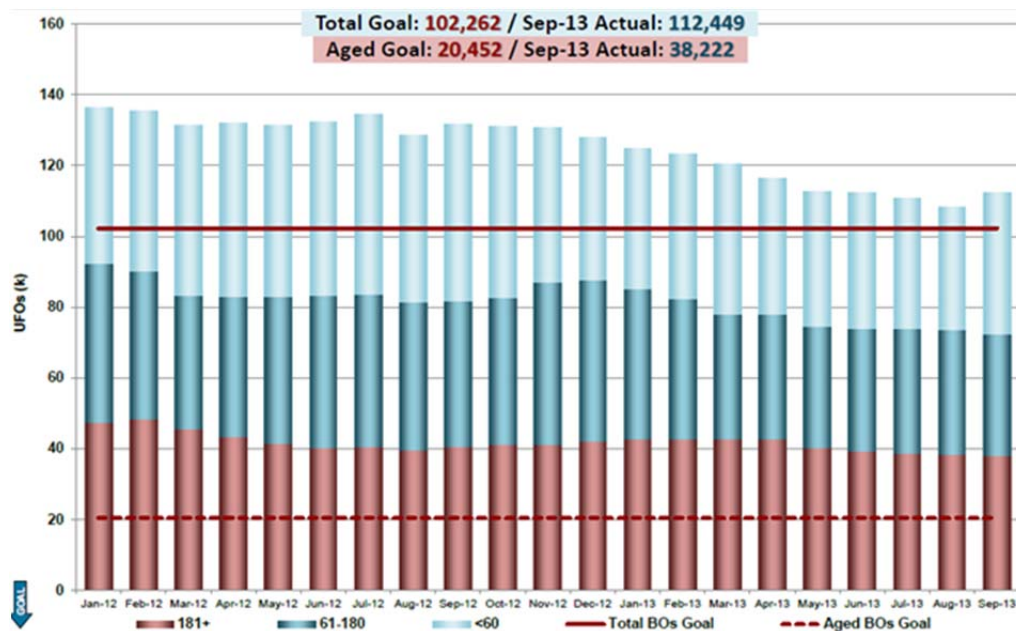
- DLA Aviation is and has been experiencing extensive procurement lead times when contracting for consumable items that include repair parts for DoD weapon systems.
- DLA Aviation is and has been experiencing a very large number of backorders.

2. Discussion of the Problem Statements

There are two categories of problems for which root-cause analysis problem statements can realistically be generated. Those categories are: (1) the cost of engineering support (DLA Form 339 costs and first article test costs) and (2) DLA supply chain responsiveness as measured in terms of the days required to satisfy unfilled orders (UFOs) or requisitions. The cost of the engineering support that DLA Aviation purchases from the military services' engineering activities comes to approximately \$80 million annually. DLA recoups these costs by adding them into the costs of consumable items

that are subsequently sold to the warfighter. However, the magnitude of the cost problem was not considered to be sufficiently severe as to require a root-cause analysis.¹

The second category—customer support—from which the two root-cause problem statements were derived, has a direct bearing on DoD supply chain performance and the materiel readiness of DoD weapon systems. Figure 3-1, below, shows that over a recent 20-month period DLA Aviation backorders ranged from 110,000 to 135,000 UFOs or requisitions at any time. This number of UFOs overstates the magnitude of the backorder problem since many of these backorders are filled within the first 15 days or so after entering into backorder status. (These rapidly filled backorders are the result of DLA’s definition of backorders² and various administrative factors, i.e., packaging an item for shipment times.) Still, the magnitude of the backorder problem is very large and it has a direct impact on DoD supply chain performance and weapon systems’ materiel readiness, i.e., a lack of repair parts to repair unserviceable weapon systems. For this reason the supply chain responsiveness category was selected as the more critical of the two categories and it formed the basis for the two root-cause problem statements.



The goals shown in Figure 3-1 are Headquarters, DLA established goals.

Figure 3-1. DLA Aviation Total/Aged Backorders

¹ The specific costs associated with engineering support, first article testing, and TDPs are included in Chapters 4 and 5.

² Backorders are customers’ requests for items of supply (requisitions) that are not *immediately* provided to the requestors. Backorders are associated with either stocked or non-stocked items of supply. Aged or long term backorders are those backorders that exceed 180 days.

DLA is tasked by the SecDef in DoDD 5105.22 to provide effective and efficient worldwide logistics support to the Military Departments and the Combatant Commands. Currently, the performance of the joint DLA–military services engineering support business model is restricting the effective and efficient operation of the DoD supply chain. This, in turn, adversely affects the timely availability of weapon system repair parts to the military services’ users. This situation is depicted in Figure 3-2 below.

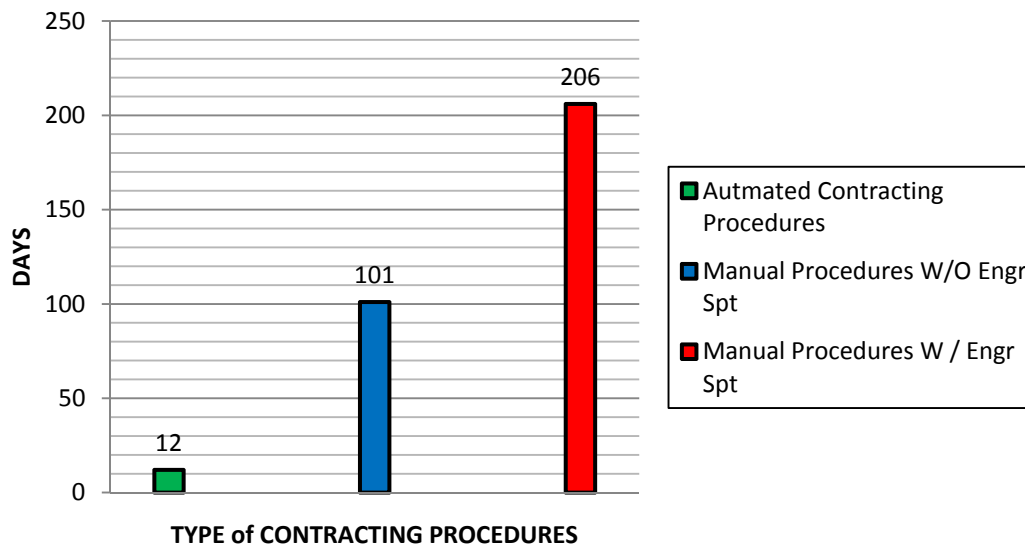


Figure 3-2. Comparison of Average DLA Administrative Lead Times

The ALT for items that require engineering support is averaging 206 days, approximately twice as long as the 101-day ALT for manually processed contracts that do not require engineering support. DLA consumes 160 days of the 206 ALT days, while the ESAs expend the remaining 46 days. The 160-day DLA processing period is 59 days longer than DLA takes when manually processing contracts that do not require engineering support, i.e., 160 days vice 101 days³.

The two ALTs for manually processed contracts greatly exceed the average ALT of approximately 12 days for automated contracts and purchase orders by roughly one order of magnitude. The difference between the 12 days and the 206 days is a rough measure of the time burden that the engineering support system and manual contracting, when required, places on the procurement process.

The materiel readiness of DoD weapon systems is highly dependent on the timely availability of quality weapon system consumable items or repair parts. DLA manages

³ Institute for Defense Analyses, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply chain*, May 2007.

approximately 2.4 million of those parts; 53 percent are classified as Critical Application Items (CAIs). A CAI is defined as an item that is essential to a weapon system's performance or operation, or the preservation of life or safety of operating personnel. Conservatively, 30 percent of the CAIs classified by the military services are either non-critical or non-weapon system items.⁴ CAIs frequently require the military services to provide varying degrees of engineering support when they are procured by DLA. The performance of the engineering support system, since it is primarily focused on the CAIs and other weapon system consumable parts, has a far-reaching effect on the materiel readiness of DoD weapon systems. On the one hand, the engineering support system reduces procurement risk of acquiring consumable items that do not fully conform to their technical specifications. On the other hand, the engineering support system significantly increases procurement lead times (ALT⁵ + PLT⁶).

3. Historical Basis for the Problem Statement

The DLA consumable item backorder problem originated in 1990 when the Deputy Secretary of Defense approved the recommendations contained in the *Inventory Control Point [ICP] Consolidation Study Report* and issued DMRD 926 under the same title. The report's central recommendation transferred Item Management (IM) responsibilities for approximately 1 million consumable items from the military services to DLA, commonly referred to as Consumable Item Transfer (CIT) I. This was subsequently followed in the mid-1990s by CIT II and a decade later by BRAC 05. Appendix A contains the DMRD 926 study approval memorandum and executive summary.

C. Root Cause Analysis

1. Overview

Figure 3-3 portrays the root-cause analysis process. It starts, at the upper left of the figure, by summarizing the two problem statements previously introduced in Section B, above. In parenthesis, and throughout the figure, are listed some relevant supporting information designed to add a sense of realism to the analysis. Moving to the right, there are portrayed six factors that directly contribute to the backorder problem but are not the root-causes of the two problem statements. The figure also shows two sets of *other* contributing factors that also influence the backorder problem. They address secondary policies and practices that impact backorders and functionally reside outside of the

⁴ Institute for Defense Analyses, *Improving the Management of Critical Application Items (CAIs)*, dated February 2011.

⁵ ALT: Administrative Lead Time.

⁶ PLT: Production Lead Time.

technical-quality functional area. Ultimately, this analytical process is terminated, at the lower right of the figure, by arriving at two root-causes from which the DLA Aviation backorder problem stems. *The following discussion will address each step of this analysis starting with the two problem statements and then continuing, in order, with each of the six contributing factors, and finally, concluding with a discussion of the two root-causes of the backorder situation.*

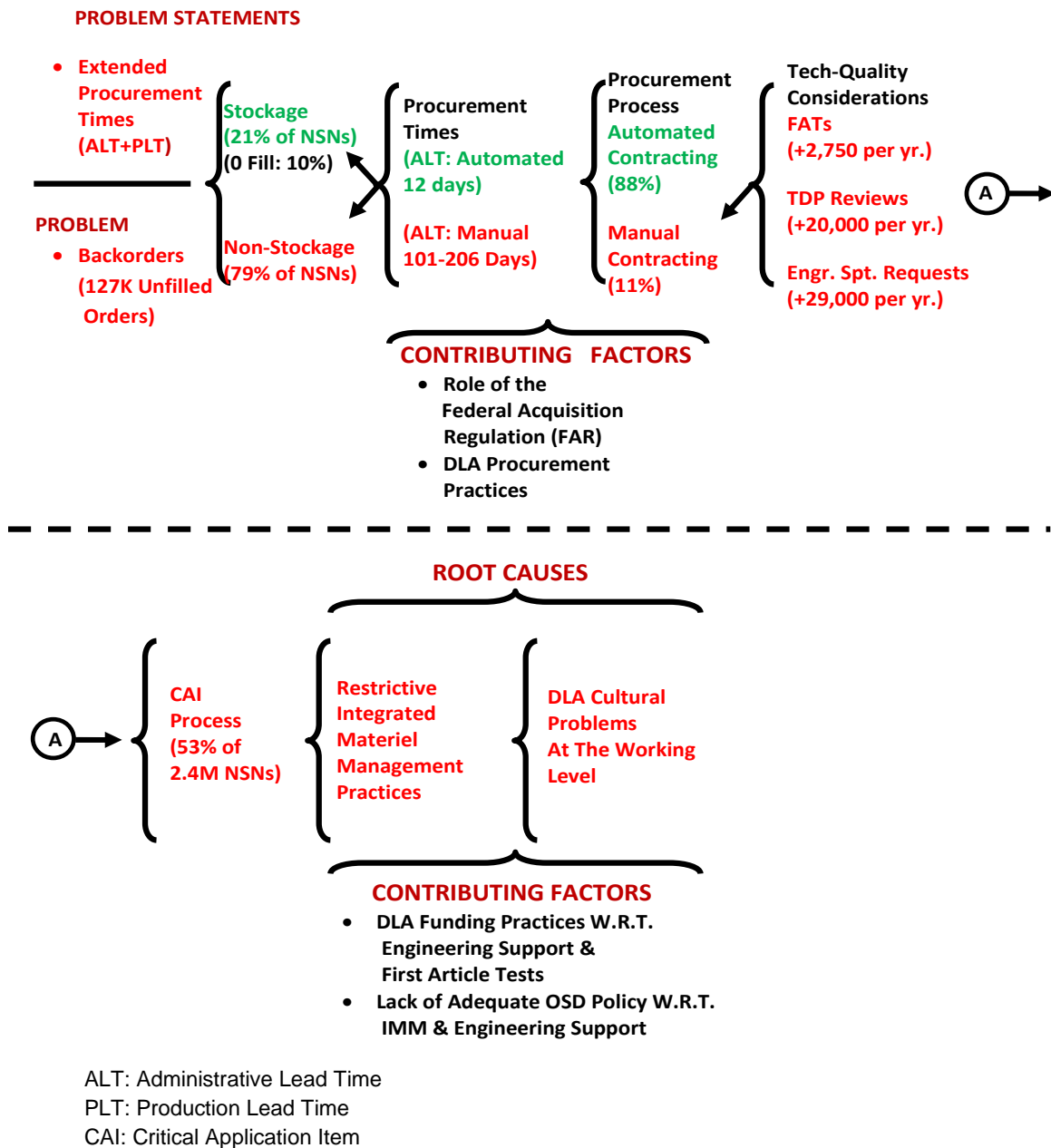


Figure 3-3. Root-Cause Analysis

2. The Problem Statements

Figure 3-3 summarized the two previously discussed problem statements. The first listed problem statement is a condensed version of, “DLA Aviation is and has been experiencing extensive procurement lead times when contracting for consumable items that include repair parts for DoD weapon systems.” The reference to procurement lead times refers to the extensive Administrative Lead Times (ALTs) and Production Lead Times (PLTs). It suffices to say that if these times were extremely short for all DLA procurements there would still be backorders, but they would not be a matter of concern. The second condensed problem statement refers to “DLA Aviation is and has been experiencing a very large number of backorders.” The 127,174 unfilled orders, listed in the figure, represent the DLA Aviation backorder situation on June 24, 2013. The derivation of this data is contained in Table 6-3, found in Chapter 6, and the supporting discussion. The magnitude of the 127,174 backorders is significantly reduced when only long term backorders are considered.

3. Stockage and Non-Stockage

The issue of stockage, while outside of the scope of this study, does have a direct bearing on DLA Aviation backorders. Figure 6-3, in Chapter 6, shows that 21 percent of the DLA Aviation unique, critical backordered NSNs are stockage items and 79 percent are non-stockage items. Based on current data, approximately ten percent of these stockage NSNs are at zero fill. As such they are a contributor to backorders but not a major one. The significance of this data arises not so much from the particular numerical values but rather from the general conclusion that non-stockage items are by a wide margin a larger contributor to backorders than are stockage items. This is not surprising but it begs the question of why this is the case and what can be done to reduce the impact of non-stockage items on backorders. This issue is further refined in the next four sections but can only be satisfactorily resolved by addressing the root-causes of the backorder problem.

4. Procurement Times

A major contributor to the stockage problem, and subsequently to the long term backorder problem, is the ALTs for manually processed procurements. As discussed in Section 2 in connection with Figure 3-2, manual procurements are typically those that require engineering support. This results in long ALTs that vary between 101 to 206 days. The significance of this becomes clear when those ALTs are compared to approximately 12-day ALTs for automated procurements.

5. Procurement Process

For DLA Aviation, the procurement process' level of automated contracting varies over time. But recent data demonstrate that only 4 percent of the awards are fully manual. Currently 18 percent are for automated solicitations that are followed by a manual contract award process. The number of fully manual procurements has improved significantly since 2 years ago, when approximately 10 percent of the awards were fully manual. (In Figure 3-3, the 13 percent figure is an aggregate number, the sum of the fully manual plus half of automated solicitation only.) The fully manual procurement results in the extended ALT times as discussed in the preceding section. Correspondingly, automated-solicitations-only procurements have a major impact on PLTs. This raises two issues:

- What technical-quality considerations are causing the procurement process to utilize either fully manual process or automated solicitation followed by manual award process?
- What is the impact of these technical-quality considerations on ALT and PLT?

The resolution of these issues ultimately rests with resolving the root causes of the backorder problem.

As Figure 3-3 shows there are two other contributing factors that impact the procurement process that are not of technical-quality origin: (1) the role of the Federal Acquisition Regulation (FAR) in consumable item procurements and (2) selected DLA procurement practices. In a number of ways the FAR guidance, which OSD requires DLA to implement, is being overridden by DLAI 3200.1, *Joint Engineering Support Instruction (JESI)*, in a manner that increases procurement lead times. A case in point is first article test practices, which are discussed and analyzed in detail in the next chapter. Another DLA procurement practice that is impacting backorders and procurement lead times is the practice of buying items in such small quantities that contractors elect not to bid those solicitations. Per DLAI 3200.1, a non-bid requires DLA to seek engineering support from the ESAs, which further increases the procurement lead time. IDA's estimate is that the minimum contract value for consumable items should be approximately \$2,000.⁷ The next significant factor portrayed in Figure 3-3 will address the impact of the technical-quality functional area on the procurement process.

⁷ The \$2,000 is an IDA estimate. That dollar amount was included in a briefing to DLA. DLA found the \$2,000 amount credible as a recently completed DORRA study concluded that the minimum contract value for consumable items should be \$2,200.

6. Technical – Quality Considerations That Significantly Impact the Procurement Process

There are three primary considerations of interest: Technical Data Package (TDP) reviews, First Article Tests (FATs) and requests for engineering support, i.e., submission of DLA Form 339 to the military services' engineering support activities. FATs are addressed in detail in Chapter 5 and TDP reviews in Chapter 6.

TDP reviews and the submission of DLA Form 339s are very closely related. In the period from January 2008 through June 2013, DLA Aviation submitted 123,033 DLA Form 339s to the ESAs. Of those, 91,367, or 74 percent, were solely to request support in performing TDP reviews. These data reflect that TDP reviews are an important contributor to backorders since they, on the average, add 206 days to ALTs. A contributing factor to the 206 days is the 49-day average processing time for a TDP review; 36 days are utilized by engineering support activities and 13 days by DLA Aviation. Another contributing factor is the TDP review backlog. In September 2013 the DLA Aviation backlog was 2,357 TDP actions; however, by May 2014 the backlog had been reduced to 505. This is a significant improvement in TDP review operations but it does not fully negate the impact of TDP reviews on ALTs and their impact on long term backorders. An additional contributing fact that is not necessarily related to the TDP reviews is the processing time taken by technical-quality specialists once the TDP review is completed. It is apparent that TDP reviews are a major source of technical blocks, a significant contributor to ALTs, and a major cause of long term backorders. In Chapter 6 a detailed analysis of TDP reviews is provided and recommendations are made on how to improve the TDP review process and reduce the negative effects on ALTs and backorders.

First Article Tests are also a major cause of long term backorders. FATs affect long term backorders in two significant ways: by the number of tests performed and by the time it takes to perform these tests. In 2009 DLA Aviation performed 987 tests; in 2012 it had increased to 2,798 tests, a 183-percent increase. The potential for growth in the future is significant because 34,463 DLA Aviation managed items are coded in EBS as requiring first article tests. The average length of time it takes to perform a first article test guarantees that those tested items will result in long term backorders: on the average, 409 days are required for Government-performed FATs and 342 days for contractor-performed FATs. The significance of these FAT times stems from the requirement that contractors are not allowed to begin production of contracted items until the Government validates the FAT results. In Chapter 5 a detailed analysis of FATs is performed and recommendations are made on how to improve the FAT process and reduce the negative effects on backorders.

DLA Aviation's engineering support requests were partly addressed earlier in this section when discussing TDP reviews. The 26 percent of non-TDP requests for which

DLA Aviation requests engineering support from the military services' ESAs addresses numerous issues. Table 3-3, in section 8, enumerates those issues; it also justifies the need for those engineering support requests. The far right column of that table shows that the ESAs are, in most cases, the decision-maker for those numerous issues (IMM subtasks) listed in the preceding column. DLAI 3200.1, *JESI*, defines those subtasks and prescribes a decentralized management process intended to ensure that the military services receive quality items from DLA, items that conform to their product descriptions. This decentralized engineering management system is costly in terms of the time it requires to provide engineering support and resolve issues. It is a major contributor to backorders. This topic will be discussed further in Chapter 6.

7. Critical Application Item (CAI) Process

DLA is the item manager for approximately 2.4 million consumable item NSNs, of which approximately 53 percent are classified as Critical Application Items.⁸ While the approximately 1.3 million NSNs classified as CAIs intuitively seems to be excessive, that number is highly dependent on the definition of CAIs as well as other factors.

*A CAI is an item that is essential to weapon system performance or operation, or the preservation of life or safety of operating personnel, as determined by the cognizant engineering activity(s).*⁹

In the absence of a criticality determination made by the cognizant ESA, a Weapon System Essentiality Code of 1 (Failure renders end item inoperable) or 5 (Needed for personnel safety) indicates that the item is a CAI.¹⁰

A holistic examination of all CAIs brings into question the effectiveness of the classification process. The following data examine the CAI distribution by Federal Supply Class. They also include a subjective assessment, using colors, to determine the appropriateness of the NSNs being classified as CAIs based on their Federal Supply Class (FSC); green – appropriate, etc.

- 139 FSCs classified as appropriate and they contain 584,009 CAIs. Examples include
 - FSC 1420, Guided Missile Components [1,079 NSNs]
 - FSC 1560, Airframe structural components [55,256 NSNs]
- 75 FSCs classified as questionable and they contain 451,884 CAIs Examples include:

⁸ IDA Paper-D4217, *Improving the management of Critical Application Items (CAIs)*, February 2011.

⁹ DLAI 3200.1, *Joint Engineering Support Instruction*, undated.

¹⁰ Ibid.

- FSC 4210, Fire Fighting Equipment [952 NSNs]
- FSC 5305, Screws [37,404 NSNs]
- 226 FSCs classified as not appropriate and they contain 85,281 CAIs Examples include:
 - FSC 6210, Indoor/Outdoor Electric Lighting Fixtures [7,639 NSNs]
 - FSC 5340, Hardware, Commercial [40,362 NSNs].

A different holistic examination of CAIs further brings into question the effectiveness of the classification process. This examination looks at the distribution of CAIs by weapon system types. CAIs managed by DLA supply centers simultaneously support 1,406 types of weapon systems or 88 percent of all weapon systems assigned a Weapon System Designator Code (WSDC). Correspondingly, 191 weapon systems that have WSDCs have no assigned CAIs. The following subjective examination of assigning CAIs to those 1,406 types of weapon systems is based upon the importance of those weapon systems to the military services:

- 697 weapon systems are classified as appropriate to have CAIs. An example is the Hellfire missile.
- 314 weapon systems are classified as questionable to have CAIs. An example is contract maintenance trucks.
- 396 weapon systems are classified as not appropriate to have CAIs. An example is a food sanitation center.

This holistic analysis of CAIs tends to indicate that the CAI process has resulted in a greatly inflated number of CAIs. This, in turn, increases DLA Aviation's reliance on the ESAs for support with a corresponding increase in procurement lead times and backorders.

This completes the discussion of the six factors that contribute to backorders. The first such factor dealt with the stockage issue and raised the issue of why this is a problem. The next contributing factor partly answered the first "why" question but in doing so created its own "why" question. The answer to the sixth "why" question—why an inflated CAI process—is the two root-causes of the long term backorder problem statements: restrictive Integrated Materiel Management (IMM) practices and DLA cultural problems at the working level. These two root-causes will be addressed Sections 8 and 9, respectively.

8. Restrictive Integrated Materiel Management Practices

The IMM concept is straightforward; it primarily involves the wholesale management of all NSNs that are designated as suitable for integrated materiel management. Concurrent with the consolidation of DoD Inventory Control Points (ICPs) in 1990 was the introduction of the single item manager policy. This required that all suitable NSNs be assigned to a single agency to be managed on behalf of all of DoD, but not necessarily assigned to a single agency. However, DLA was ultimately designated as the single agency IMM for in excess of 92 percent of all consumable items.

The challenging part of the IMM concept is determining which logistics functions are to be the responsibilities of the integrated materiel managers. The DMRD 926 study found that no commonly accepted definition of an ICP existed within DoD. The DMRD study team subsequently developed a definition and 18 related IMM functions. (For a more detailed discussion of this topic see Appendix B.) This list of IMM functions was subsequently used in the 1994 *DoD Commission on Roles and Missions of the Armed Forces study*. Unfortunately, the original list, which was contained in an appendix to the DMRD 926 study, no longer exists at DTIC. However, a September 1997 Logistics Management Institute (LMI) study reproduced the DMRD 926 list of IMM functions and associated tasks but with some consolidation.¹¹ The DMRD 926 list of IMM functions in the LMI study closely correlates with the set of functions assigned to DLA by the SecDef in DoDD 5105.22. Table 3-1 provides a comparison of the two sets of functions. The table shows that there is a strong correlation between the technical-quality related functions listed in DoDD 5105.22 and the DMRD 926.

The ICP Consolidation Report envisioned a management relationship where the Primary Inventory Control Activity (PICA) is in charge and responsible for managing its assigned items, i.e., the item manager in all aspects. The relevant Secondary Inventory Control Activity (SICA) would support the PICA when it is required. Regarding consumable items managed by DLA, DLA functions as the PICA and the military services' engineering support activities as the SICAs. Table 3-2 comes from the DMRD 926 *ICP Consolidated Report* via the LMI study. Its value is that it shows at the function level the PICA and SICA functional responsibilities. The areas highlighted in green are those functional areas of primary concern in this study.

¹¹ The FY96 Defense Authorization Act directed the SecDef to “conduct a review of the management by DLA of all ICPs in DoD in April 1996.” The DUSD (Logistics) asked the support of the military services in carrying out the mandated review. At the same time he tasked LMI to act as an independent evaluator.

Table 3-1. Identification of Integrated Materiel Management Functions

Integrated Materiel Management Functions	
Per DoDD 5105.22, <i>DLA</i>	Per DMRD 926, <i>ICP Report</i>
Item Management Classification	Cataloging
Cataloging	Cataloging
Requirements Determination	Requisition Process and Item Management
Supply Control	Customer Service, Stock Control, and Technical Support
Procurement	Contracting
Quality Assurance	Technical Support
Receipt	Item Management
Storage	Item Management
Preservation and Packaging	Technical Support
Issue	Item Management
Inventory Accountability	Stock Control
Transportation Management and Distribution	Item Management
Disposal Management	Item Management
Shelf-life Control	Technical Support
Provisioning	Cataloging and Technical Support
Technical Logistical Data and Information	Technical Support
Engineering Support	Engineering Support
Value Engineering	Engineering Support and Technical Support
Standardization	Technical Support

Table 3-2. IMM and Military Services' Functions

DLA/PICA/IMM Functions	Military Services' Engineering Support Activities/SICA Functions
Budget Funding	Budgeting/Funding
Cataloging	Cataloging
Contracting	Allowance/Initial Supply Support Lists (ISSL) Development
Customer Service	Customer Service
Technical Support	Technical Support
Engineering Support	Engineering Services
Item Management	Configuration Management
Requisition Processing	Provisioning
Stock Control	Inventory Management
Weapon-System Secondary-Item Supply Support	

Integrated Materiel Management is a root cause of the backorder problem because DLA Aviation, and for that matter DLA, has never fully implemented all aspects of IMM as detailed in the DMRD 926 report. Specifically, it does not perform all the tasks associated with item management, quality assurance, provisioning, technical logistical data and information, and engineering support.¹² This, for the most part, results in the ESAs fulfilling those functions as they did prior to CIT I. Table 3-3 contains the DMRD 926 report's list of IMM functions and tasks and correlates them with the set of "subtasks" contained in DLAI 3200.1, *JESI*. The right hand column lists the decision-makers for each of the subtasks, which are primarily the ESAs. A comparison of Tables 1 and 3 shows that (1) the technical-quality management process is decentralized with primary decision-making authority delegated by DLA to the ESAs, and (2) the technical-quality management process bears little similarity to that envisioned by the DMRD 926.

As Figure 3-3 shows, the two root-causes are influenced by another set of contributing factors: DLA engineering support funding practices and the lack of adequate OSD policy with respect to IMM and engineering support. The *Joint Engineering Support Instruction* identifies a large number of situations for which DLA is required to seek engineering support from the ESAs (see Table 3-3). DLA, in turn, reimburses the ESAs for that support. There is anecdotal information that the requirements placed on DLA to seek engineering support are partially influenced by the funds the ESAs receive for providing that support; that is, the funds serve as an incentive for the ESAs to require DLA to request more engineering support. Current funding practices are having a corrosive effect on the performance of the engineering support system and consequently

¹² The task names correspond to those used in the DMRD 926 study.

on long term backorders. (A separate IDA study for USD (AT&L), *Independent Review of the Roles and Mission of the Defense Logistics Agency*, recommends that DLA cease reimbursing the ESAs for providing engineering support.)

Table 3-3. Engineering Support Aspects of IMM: Functions, Tasks, and Subtasks

IMM Functions DMRD 926	IMM Tasks DMRD 926	IMM Subtasks DLAI 3200.1, JESI	IMM Sub-Task Decision Maker
Engineering Support	Conduct value engineering studies	<ul style="list-style-type: none"> • Approve reverse engr. proposals • Approve reverse engr. project 	ESAs ESAs
	Perform reverse engineering analysis	<ul style="list-style-type: none"> • Approve reverse engr. proposals • Approve reverse engr. project 	ESAs ESAs
Item Management	Disposal decision	<ul style="list-style-type: none"> • Disposal decisions 	DLA
	Distribution decisions	<ul style="list-style-type: none"> • Distribution decisions 	DLA
	Requirements determination	<ul style="list-style-type: none"> • Requirements determination 	DLA
Technical Support	Develop, maintain and furnish drawings, Mil Specs. and Stds and product descriptions	<ul style="list-style-type: none"> • TDP Development / Revalidation: IAW Military Services requirements 	ESAs
	Develop, maintain and furnish shelf-life codes, deterioration codes, AMCs or tech data efforts related to value engr., reverse engr. or breakout screening programs	<ul style="list-style-type: none"> • Assign AMC/AMSC • Approve proposed changes to less restrictive AMC/AMSC • Approve shelf life extension • Approve reverse engr. proposal • Approve reverse engr. results • Approve value engr. change proposal • Tech data related to value engr. 	ESAs ESAs ESAs ESAs ESAs ESAs ESAs
	Receive and maintain tech data	<ul style="list-style-type: none"> • Receive, maintain and furnish tech. data 	DLA
	Provide technical support to item management	<ul style="list-style-type: none"> • Provide technical support to item mangt. • Approve testing requirements • Approve first article test waivers • Approve production lot testing • Approve CDRLs 	DLA ESAs ESAs ESAs ESAs

IMM Functions DMRD 926	IMM TasksDMRD 926	IMM Subtasks DLAI 3200.1, JESI	IMM Sub-Task Decision Maker
	Provide technical support to cataloging function	<ul style="list-style-type: none"> Provide technical support to cataloging function 	DLA
	Provide procurement and tech support by:		
	<ul style="list-style-type: none"> Providing TDPs 	<ul style="list-style-type: none"> Providing procurement TDPs 	DLA
	<ul style="list-style-type: none"> Identifying possible sources 	<ul style="list-style-type: none"> Identifying possible sources 	DLA
		<ul style="list-style-type: none"> DLA required to contact ESAs; no known source of supply or non-responsive offer 	ESAs
		<ul style="list-style-type: none"> Approve NSN cancellation, NSN replacement with alternate NSN, or removal of duplicate NSN 	ESAs
		<ul style="list-style-type: none"> DLA to contact ESAs; if manufacture's PN change or CAGE code change 	ESAs
		<ul style="list-style-type: none"> Approve supply sources including alternate supply sources 	ESAs
		<ul style="list-style-type: none"> Surplus offers without adequate documentation 	ESAs/DLA
		<ul style="list-style-type: none"> Surplus offers with adequate documentation 	DLA/ESAs
	<ul style="list-style-type: none"> Answer contractors' technical questions 	<ul style="list-style-type: none"> Answer contractors' technical questions 	DLA
	<ul style="list-style-type: none"> Determine price reasonableness 	<ul style="list-style-type: none"> Answer contractors' technical questions 	DLA
	<ul style="list-style-type: none"> Approving or obtaining approval for waivers, deviations or alternate items 	<ul style="list-style-type: none"> Approve major nonconformance (waivers / deviations) 	ESAs
		<ul style="list-style-type: none"> Approve minor nonconformance (waivers / deviations) 	ESAs
		<ul style="list-style-type: none"> Approve alternate items 	ESAs
	<ul style="list-style-type: none"> Validating and revising procurement method codes to include sole-source breakout 	<ul style="list-style-type: none"> Assign AMC/AMSC Approve proposed changes to less restrictive AMC/AMSC 	ESAs ESAs
	<ul style="list-style-type: none"> Determine preservation, packaging, packing and item pack quantities 	<ul style="list-style-type: none"> Determine preservation, packaging, packing and item pack quantities 	DLA

IMM Functions DMRD 926	IMM Tasks DMRD 926	IMM Subtasks DLAI 3200.1, JESI	IMM Sub-Task Decision Maker
	<ul style="list-style-type: none"> Propose and maintain I&S relationships 	<ul style="list-style-type: none"> Approve NSN cancellation, NSN replacement or remove duplicate NSN 	ESAs
	<ul style="list-style-type: none"> Review, recommend or initiate actions for materiel improvement and cost savings 	<ul style="list-style-type: none"> Approve value engineering change proposals 	ESAs
	<ul style="list-style-type: none"> Develop and Effect QA policies for procurements & storage, review QA contract provisions and process PQDRs 	<ul style="list-style-type: none"> Approve contract quality requirements Process deficiency reports (PQDRs) 	ESAs DLA
Wpn. Sys. Secondary Item of Supply Support	Acquire and maintain applications and essentiality data	<ul style="list-style-type: none"> Acquire and maintain application & essentiality data Approving essentiality data 	DLA ESAs
	Providing intensive management of items according to criticality	<ul style="list-style-type: none"> Providing intensive management of items according to criticality 	JESI

DLAI 3200.1, *JESI*, was jointly developed in 2008-2010 by the military services' ESAs and DLA in the absence of any comprehensive OSD guidance. It reflects the interest of the engineering community. It does not address the interest of DLA in a satisfactory manner; it is a stove pipe document. As such, it does not consider the requirements placed on DLA by DoDD 5105.22, *DLA*, and DMRD 926. The impact of this is that integrated materiel management is performed in a manner that is not in the best interest of DoD and the military services.

9. DLA Culture Problems at the Working Level

The DLA Aviation's cultural problem is a mixture of identity and/or authority. Many product specialists, technical data specialists, procurement specialists, and their supervisors believe they do not have the authority to make a technical-quality *decision*, to challenge an ESA *decision* or to modify an ESA *decision*. In essence, these DLA Aviation specialists feel compelled to go to the ESAs with issues and request decisions. In fact, IMM, as envisioned by the DMRD 926 decision, encourages the specialists to seek advice from the ESAs, when in their opinion, they need assistance *but not guidance*.

or decisions. This cultural problem was documented in a previous IDA study¹³ and confirmed in interviews conducted as part of this study. In summary, 41 individuals were interviewed as part of the 2007 study; 25 percent stated they received their guidance from the ESAs and 22 percent from DLA. The remaining 53 percent primarily relied on a combination of ESA guidance and their own judgment. When examining the results of these interviews, a senior headquarters DLA individual was upset to find that product specialists, etc., did not always follow the ESA's guidance.

10. Assessment

The root-cause analysis of the backorder problem identified two root-causes. These two root-causes impact the performance of both the technical-quality and the procurement functional areas in a negative manner. The elimination of these root causes would permit those two functional areas to operate far more efficiently. This would not eliminate all backorders, but it has the potential to significantly reduce the number of backorders that DLA Aviation is experiencing, especially long term backorders.

The effects emanating from the two root causes are felt by the technical-quality and procurement processes associated with the six factors portrayed in Figure 3-3. This, in turn, results in those processes operating in a suboptimal manner. The consequences of this include actions that are of minimal or no value, violate the Federal Acquisition Regulation, increase procurement lead times, and/or increase the cost of consumable items to the military services.

In Figure 3-3, the last of the six factors prior to arriving at the two root-causes is the CAI process. The CAI process as set forth in DLAI 3200.1, *JESI*, does have a very significant impact on the other five factors and on backorders. However, that process was not selected as a root cause because the poor performance of the CAI process is directly attributable to existing IMM practices, one of the root-causes.

11. Conclusions

The restrictive use of IMM by DLA goes back 23 years and the DLA cultural problem, at the working level, extends back at least to the Navy-DLA Air Launch and Recovery Equipment (ALRE) problem in 2000. Hence, the present set of practices is firmly embedded in both DLA and the military services' engineering support activities. As such, fixing the two root cause problems will take considerable effort and will require the active support of the Director, DLA and the USD(AT&L). Specifically, it will require restructuring the DoD logistics operating space with respect to consumable items:

¹³ IDA Paper-4202, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply Chain*, May 2007.

management, procurement, and supply. Figure 3-4 portrays the scope of that restructuring.

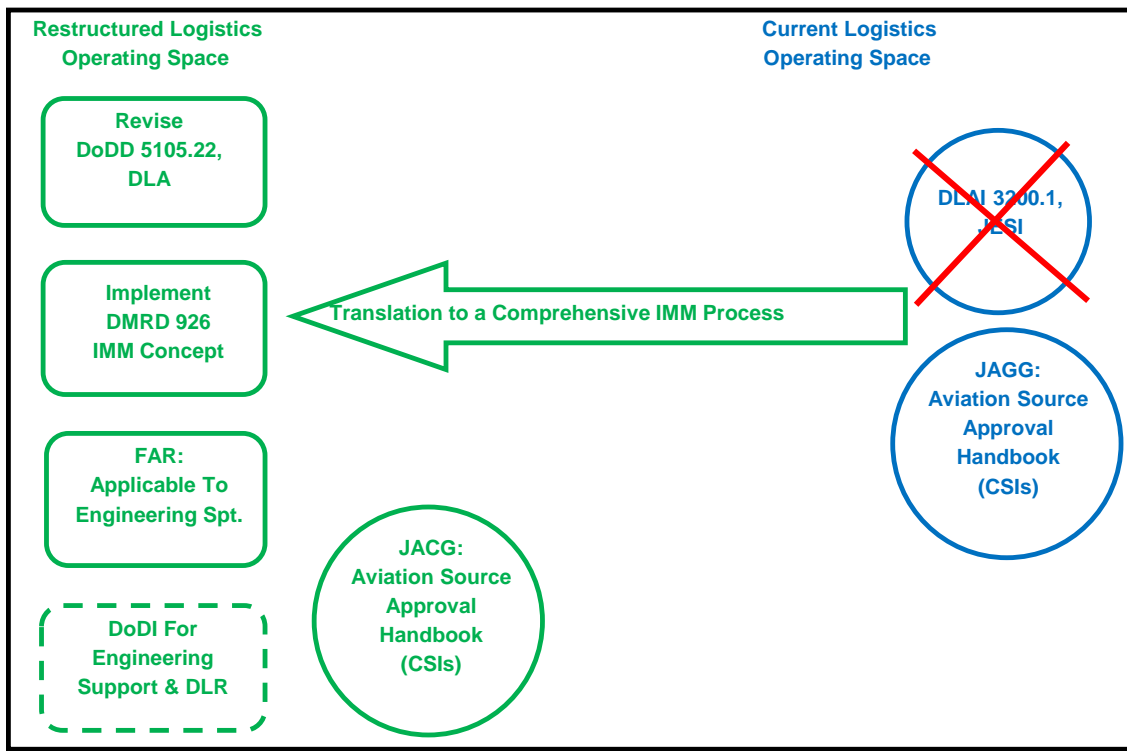


Figure 3-4. DoD Logistics Operating Space

The role of DoDD 5105.22 is critical to the restructuring efforts. This directive designates DLA as a Combat Support Agency and assigns to DLA its mission, responsibilities and functions, and relationships with various DoD agencies and activities. (The SECDEF is required by Title 10, United States Code, sections 113, 191, 193, and 197 to issue such a document.)

The current version of DoDD 5105.22, dated May 2006, does not adequately address the DMRD 926 decision to transfer item management responsibilities from the military services to DLA. (Nor does the directive address the BRAC 2005 decision to transfer the procurement of DLRs from the military services to DLA.) The directive does state that, “The Director, DLA shall provide materiel commodities and supply chain management for items of supply that have been determined to be appropriate for *integrated management by a single agency* on behalf of all of DoD.” As the study resulting in the issuing of DMRD 926 highlighted, there is no commonly accepted DoD definition of IMM. That study did, however, define 18 IMM functions and 170 associated tasks, some of which are listed as functions in DoDD 5105.22. However, the DoDD does not adequately clarify the purpose and scope of IMM as it applies to DLA. Nor does it associate the various functions assigned to DLA as IMM functions. ***This lack***

of clarity has resulted in 23 years of confusion, wasted resources, and supply chain performance issues.

Various versions of DLAI 3200.1 have been in circulation since July 1972. The current version, dated April 2010,¹⁴ partly came about as a result of an IDA study.¹⁵ Headquarters, DLA conducted a series of tiered lean events to address the study's findings and recommendations. As a result, DLA ultimately assigned the responsibility of rewriting DLAI 3200.1 to an ESA-chaired committee. The rewrite **did not** take into consideration relevant guidance contained in DoDD 5105.22, the Federal Acquisition Regulation, and several other relevant directives. DLAI 3200.1, *JESI*, primarily addresses the requirement for DLA to seek engineering support from the military services' engineering activities¹⁶ and delineates the particular circumstances in which it is required. *It does this partly at the expense of the combatant commands in that requirements imposed on DLA often delay timely delivery of repair parts to the combatant commands which, in turn, affects their materiel readiness.*

The functions addressed in DLAI 3200.1 and other related functions are more appropriately addressed in a DoDI sponsored by ASD (L&MR). Currently, there is no DoDI that addresses integrated materiel management, technical-quality aspects of consumable item management, and the procurement management of DLRs. The absence of such an instruction has created a void, which has permitted documents such as DLAI 3200.1 to be developed. These documents have come to serve the interest of particular groups, i.e., create stovepipes, often at the expense of DoD, e.g., the Combatant Commands.

The proposed DoDI needs to support Service customers by eliminating unnecessary ESA requirements. To do this, it needs to reflect the logistics needs of DoD and the Combatant Commands, foster improved DoD supply chain responsiveness, and clearly delineate the authority of integrated materiel management agencies.

There is an important role for a more focused and better managed CAI process even though it is not displayed in Figure 3-5. The definition of CAI forms the foundation on which the CAI process is built. That definition focuses on weapon system performance or operations and the safety of weapon systems' operational personnel. These attributes are very relevant to the DLA demand chain and its customer support function. Though

¹⁴ The April 2010 date is an operative date as the Army subsequently withdrew its approval of the instruction and as a result the instruction has never been formally issued.

¹⁵ IDA Paper-4202, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply Chain*, May 2007.

¹⁶ DLAI 3200.1 is applicable to consumable items such as weapon system repair parts, clothing, textiles and individual equipment items (CT&IE), medical equipment, dental equipment, veterinary equipment, and medical peculiar repair parts.

not presently so utilized, these attributes could be used to supplement current stockage selection procedures.

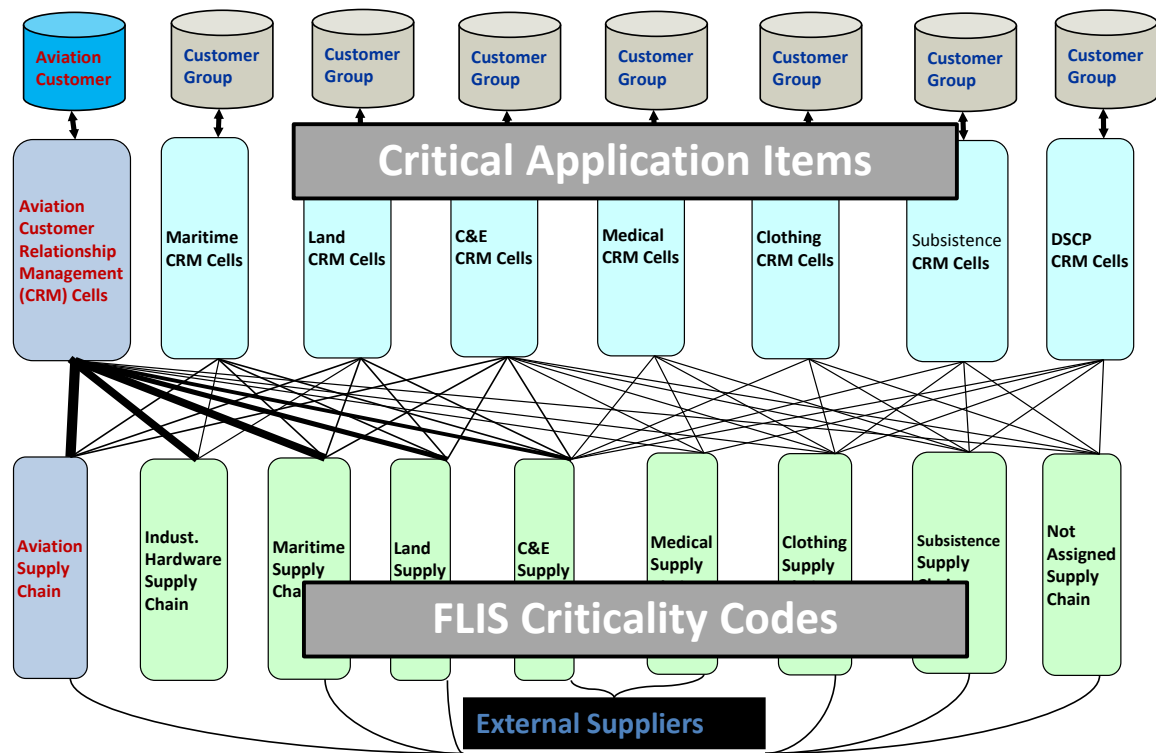


Figure 3-5. Demand and Supply Chain Management

The CAI definition, as previously discussed, is not particularly useful when it comes to supply chain management. With respect to procurement, supply chain management needs to know how difficult an item will be to manufacture. Given this information, DLA can then include in solicitations the appropriate level of quality control; i.e., technical-quality personnel can select the appropriate Quality Control Code (QCC). FLIS currently contains a suitable set of criticality codes. (See Table 3-4 below.) These codes should be associated with the consumable items for which DLA is the item manager.

Table 3-4. FLIS Criticality Codes

Code	Description	Critical Feature (i.e., fit, tolerance)	Nuclear Hardness Properties	Aviation CSI	Non-Aviation CSI	Number In FLIS	Per-cent
X	NSN has no nuclear hardness or critical features	No	No			9,445,236	79.02
Null	Criticality code field is empty					2,064,464	17.25
Y	NSN has no nuclear hardness features but has critical features	Yes	No			199,632	1.67
N	NSN has no critical features; nuclear hardness features TBD	No	TBD			124,058	1.04
F	NSN is an aviation CSI/FSCAP			Yes		102,017	0.85
H	NSN has nuclear hardness feature; no critical feature	No	Yes			11,172	0.09
C	NSN has critical features; nuclear hardness features TBD	Yes	TBD			5,548	0.05
M	NSN has nuclear hardness and has critical features	Yes	Yes			2,278	0.02
S	NSN is non-aviation CSI				Yes	1,005	0.01
E	NSN is an ACSCI/FSCAP and has nuclear hardness features		Yes	Yes		25	0.00
	TOTAL					11,965,435	100

D. Recommendations

Recommendation 1. Redraft DoDD 5105.22, *Defense Logistics Agency*, to explicitly include IMM as one of the responsibilities and functions assigned to the Director, DLA for execution.

Recommendation 2. DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled and not reissued.

Recommendation 3. DUSD(L&MR) should develop and issue a DoDI that addresses IMM, the joint engineering support system, and the procurement management of DLRs.

Recommendation 4. Utilize the FAR guidance as it applies to technical-quality operations, e.g., first article tests.

Recommendation 5. Cease relying on CAIs to support supply chain operations.

Recommendation 6. Utilize FLIS Criticality Codes to establish the appropriate level of quality control requirements to impose on solicitations.

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4. First Article Testing

A. The First Article Test Task

The FAT section of the task order's statement of work (SOW) is both detailed and diverse in its guidance. Table 4-1 summarizes the SOW guidance in the left hand column. The table also provides a summary of the IDA responses to the SOW.

Table 4-1. First Article Test (FAT) Statement of Work (SOW) Summary

SOW Task	IDA's Response	Report Reference
Analyze all:		
• Current and recent FATs	Quantitative analysis of 5.5 years of DLA Aviation FATs	Sections D-7, 8, 10, and 11
• FAT costs	Quantitative analysis 15 years of DLA Aviation FAT costs	Section D-9
• Development and use of test plans	Qualitative discussion of test plans	Section D-6
• Impact of FAT on stockage	Qualitative discussion of FAT impact upon stockage	Section D-12
Identify root cause for increase in FATs	Integrated root-cause analysis was performed that addressed FATs, TDP reviews, and backorders	Chapter 3
Recommendations will include:		
• Ways to reduce FATs w/o sacrificing quality	Move from a 'test-in-quality' to a 'build-in-quality' process and limit FATs to source selection.	Sections D-8, F, and G
• Ways to improve performance when using DTM on FATs	Move from a 'test-in-quality' to a 'build-in-quality' process and limit FATs to source selection.	Sections D-14, F, and G
• Effectively manage FAT workload	Move from a 'test-in-quality' to a 'build-in-quality' process and limit FATs to source selection.	Sections E-3, F, and H
• Description of needed software tools	Develop two software tools that will facilitate better management of FATs	Section H

The task of performing a root-cause analysis both identifies and discusses the technical-quality operations that are negatively impacting first article tests. This analysis will be performed in an integrated manner that simultaneously addresses first article tests,

technical data packages, and backorder issues. A separate chapter, Chapter 3, is devoted to the root-cause analysis.

Additionally, the first article test guidance placed restrictions on IDA's recommendations. Those recommendations are to conform to the guidance contained in the FAR; DoDD 5105.22, *Defense Logistics Agency*; DLAI 3200.1, *Joint Engineering Support Instruction*; and Headquarters DLA Directive Type Memorandum (DTM) on FATs. These are severe constraints since there are a number of policy conflicts between those documents. Those conflicts will be discussed and analyzed in Section 4-D, *Analysis*.

The Director, Aviation Engineering, the study's sponsor, supplemented and clarified the Task Order's statement of work (SOW) guidance by requiring IDA to place particular emphases on *significantly* reducing both the time and costs required to perform technical-quality operations. IDA, in performing this study, placed a great deal of weight on that guidance. And in order to comply with that guidance, IDA considered the sponsor's guidance to take precedence over the SOW guidance requiring IDA's recommendations to conform to the relevant policy guidance contained in selected documents.

The following analysis and assessment of first article testing is complex and at times difficult to follow. It will demonstrate that current first article tests and their associated practices possess many weaknesses and are generally counterproductive, for example:

- FATs are of limited value in ensuring DLA procures quality products, i.e., products that conform to the items' product descriptions.
- FATs are major contributors to DLA Aviation's long term backorders since FATs delay the start of production in excess of one year.
- FATs are expensive.
- FAT practices do not conform to the procurement guidance contained in the FAR.

Current FAT practices can be summed up as an attempt to *test quality into* products, a practice that both academia and industry have long since discredited. As will be discussed in the Conclusion, the solution to the FAT problem (to reduce the number of FATs while preserving the quality of items procured) is to adopt a modern quality process – *build quality into* DLA Aviation procured products.

B. First Article Test Dynamics

The purpose of performing a first article test and approval, per the *DLA Technical-Quality Policies and Procedures Desk Book*, is to ensure that the contractor can furnish a product that meets the contract's *technical and quality assurance requirements*, and thereby minimizes risks for both the contractor and the Government. The Federal

Acquisition Regulation (FAR), Subpart 2.1, *Definitions*, defines both “first article” and “first article testing” in a similar fashion. Those definitions are:

- “First article”—a preproduction model, initial production sample, test sample, first lot, pilot lot, or pilot model.
- “First article testing”—testing and evaluating the first article for conformance with specified contract requirements before or in the initial stage of production.

These definitions accurately describe “first article” and “first article testing” as they relate to DLA managed consumable items, with one minor modification. First articles, with respect to DLA managed items, do not include either “pilot lot” or “pilot model” items. (Those types of first articles are associated with the development and acquisition of weapon systems.) The FAR also sets forth, in Subpart 9.3, first article test policy that is applicable to all of DoD. DLAI 3200.1, *Joint Engineering Support Instruction*, also contains guidance concerning the roles of engineering support activities and DLA when contracting for first article testing.

The selection of consumable items for first article testing is done by the military services’ ESAs. This is primarily accomplished in one of two ways. The predominant method of identifying DLA Aviation’s first article test items is employed solely by Air Force ESAs. As part of a TDP development or review, Air Force ESAs indicate on their AMC/AMSC Screening Analysis Worksheet Report¹ that a first article test is required. This worksheet, along with an Engineering Data List, is the Air Force ESAs’ response to a specific type of DLA Aviation request for engineering support: review of a TDP. The other military services’ ESAs do not employ this formal and systematic type of process for identifying NSNs that require first article tests. Instead they employ another method for identifying NSNs that require first article tests: the ESAs include that guidance directly in their response to a DLA Aviation Request for Engineering Support, DLA Form 339. Formerly, DLA Aviation could also select items for first article testing. However, the current version of DLAI 3200.1, *Joint Engineering Support Instructions*, requires DLA Aviation to first seek approval from the cognizant ESA.

Upon notification by an ESA that an NSN requires first article testing, this information is recorded by DLA Aviation in the Enterprise Business System’s (EBS’s) Material Master, for that NSN, in the first article test indicator field.² That field is required to be filled in before a technical-quality specialist can proceed to include a first

¹ AMC/AMSC Screening Analysis Worksheet Report is an Air Force-unique form.

² An ESA notification that an item requires first article testing is not necessarily associated with an active purchase request nor is it associated with a particular contractor. The ESA notification is a requirement that is intended to ensure that the item, whenever procured, is a quality product; it conforms to the item’s product description as contained in the contract.

article test requirement in a purchase request, the document that forms the basis for a solicitation. Once an NSN's first article indicator field is annotated in EBS as requiring a first article test it remains so annotated until the technical-quality specialist manually removes the annotation at a later date.

When a purchase request has been annotated as requiring a first article test, the procurement specialist then includes the appropriate FAR clauses and relevant documents in the solicitation. The solicitation will always indicate whether the first article test will be performed by the U.S. Government or the winning offerer, i.e., a contractor-conducted FAT. In the case of Government first article testing (GFAT), the testing organization is typically associated with the ESA requiring the first article test. That test facility may, and usually does, perform the test, but they can also contract with a commercial tester. In either case, the contractor may request a waiver of the first article test requirement. Such requests are typically based on the contractor's past performance. In all cases, DLA Aviation is required to have the cognizant ESA evaluate waiver requests.

When available, the procurement specialist will include in the solicitation a copy of the test plan. However, this is not the normal situation. For Government first article testing, the test facility typically creates a test plan upon receipt of the first article. In the case of contractor first article testing (CFAT), the contractor is required to develop a test plan and have it approved by the cognizant ESA. The Administrative Contracting Office (ACO) will monitor a contractor's first article test if so required by the contract.

Once a Government first article test is completed, the cognizant ESA or test facility will notify DLA Aviation of the test results. The procurement specialists will then notify the contractor of those results. If the first article passed the test, the contractor is then given permission to begin production. If the item failed the test, the procurement specialist will so notify the contractor of the test results and of the Government's decision regarding retesting or contract cancellation. A similar post-test process occurs with contractor first article tests, except in this case the cognizant ESA evaluates the contractor's test results.

C. Data

IDA's approach to analyzing the FAT process primarily relied on using FAT data maintained by the EBS. The most useful EBS data were located in the Quality Management (QM) portion of the System's Applications module: specifically, the FAT report test data (ZT Test results). This yielded FAT completion dates and test report dates. Equally valuable were the monthly financial files maintained by the DLA Aviation Comptroller, which contained FAT expenditure data. Other selected EBS data were obtained from the DLA Operations Research and Resource Analysis (DORRA) activity and directly from DLA Aviation. These included:

- All DLA Aviation assigned NSNs
- All DLA Aviation items assigned NSNs coded FAT = Y and various related codes:
 - Acquisition Method Code/Acquisition Method Suffix Code (AMC/AMSC) for all DLA Aviation assigned items. (An item's AMC/AMSC identifies its acquisition strategy)
 - Acquisition Advice Coded (AAC) items
 - All Weapons System Designator Coded (WSDC) items
 - All Critical Safety Items (CSIs)
 - Cognizant Engineering Support Activities (ESAs)
 - Contract award dates.

Additional data were collected from three other types of sources: interviews, policy documents, and previous IDA studies. While the analysis of EBS data provided insights into what was happening, interview data provided insights into why it happened. These interviews were conducted with DLA Aviation contracting offices, procurement specialists, and technical-quality specialists. IDA utilized five documents to identify relevant policies and to support the analysis of related policy issues:

- Federal Acquisition Regulation (FAR)
- DoDD 5105.22, *Defense Logistics Agency*
- *DLA Technical Support Policy and Procedures Desk Book*
- DLAI 3200.1, *Joint Engineering Support System (JESI)*³
- DLA Headquarters, *Directive-Type Memorandum (DTM) 13-007-DLA First Article Requirements and Process Management*, dated August 2013.

Two previous IDA studies that were performed for DLA provided useful insights and historical perspectives. These studies were the:

- IDA Paper P-4202, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply Chain*
- IDA Paper P-3983, *First Article Test Management at the Defense Supply Center Richmond*.

³ The current DLAI 3200.1 is not an official document since that the Army withdrew its concurrence shortly after the document was adopted. The last fully coordinated and adopted DLAI 3200.1 is the 31 October 1994 edition. The 31 October 2002 edition was a coordination draft only; DLA never staffed it within the agency and it was not approved by the Navy.

D. Analysis

1. Overview

The objective of the various first article test analyses was to characterize FATs: their utility as an engineering support operation, their impact on DoD supply chain operations, their conformance with policy, etc. To accomplish that objective, 13 independent analyses were performed. These analyses are listed in Table 4-2 below

Table 4-2. First Article Test Analyses

Individual Analysis	Section Reference
Analysis of the Relationship Between FAR Subpart 9.3 and FAR Subpart 46.1	Sec. D – 2
Analysis of the Relationship Between FAR Subpart 9.3, <i>First Article Test and Approval</i> , and DLA 3200.1, <i>Joint Engineering Support Instruction</i>	Sec. D – 3
Analysis of the Relationships Between DoDD 5105.22, DLA; FAR Subpart 9.3, <i>First Article Test & Approval</i> ; and DLA 3200.1, <i>JESI</i> .	Sec. D – 4
Analysis of the Relationship Between First Article Tests and Quality Control Codes (QCCs)	Sec. D – 5
Analysis of the Use of First Article Test Plans	Sec. D – 6
Analysis of the Number of Candidate NSNs for First Article Testing	Sec. D – 7
Analysis of First Article Tests in Terms of Acquisition Method Codes/ Acquisition Method Suffix Codes (AMC/AMSC)	Sec. D – 8
Analysis of the Cost of First Article Testing	Sec. D – 9
Analysis of the Duration of First Article Tests	Sec. D – 10
Analysis of the Impact of First Article Tests on Procurement Lead Times	Sec. D – 11
Analysis of the Impact of First Article Tests on Backorders	Sec. D – 12
Analysis of DLA Aviation's Use of Government Contract Quality Assurance	Sec. D – 13
Analysis of DLA Aviation's Implementation of DTM 13-007, <i>DLA First Article Requirements and Process Management</i>	Sec. D - 14

The results of these analyses will, in Section E, *Assessment*, be collectively utilized to portray how DLA Aviation integrates policy, first article testing requirements, and procurement requirements while, at the same time, striving to be more responsive to the needs of the operational forces and industrial customers. This involves the assessment of the policy considerations, management practices, time and cost performance, and utility of first article testing as a quality assurance practice.

2. Analysis of the Relationship between FAR Subpart 9.3 and FAR Subpart 46.1

FAR Part 9, *Contractor Qualifications*, contains policies, standards, procedures, and responsibilities intended to ensure that prospective contractors are responsible and can furnish qualified products. (FAR Subpart 9.3 addresses first article testing and approval.)

FAR Part 46, *Quality Assurance*, contains policies and procedures designed to ensure that the supplies acquired under Government contract conform to the contract's quality requirements.⁴ Table 4-3 displays the impact of FAR Part 9 and FAR Part 46 on various phases of an acquisition and the intended consequences. The first article test portion of the table is highlighted.

Table 4-3. Comparison: FAR Part 9 & FAR Part 46

FAR Part 9, Contractor Qualifications			FAR Part 46, Quality Assurance		
Acquisition Phase	Objective	Examples	Acquisition Phase	Objective	Examples
Solicitation Phase	Ensure Contractor is Qualified	Pre-award Survey			
Post Contract Award, <i>Pre-production Phase</i>	Ensure Contractor Can Furnish Quality Products	First Article Test (FAT)	Post Contract Award, <i>Production Phase</i>	Quality Assurance	Production Lot Test (PLT)

However, FAR Subpart 9.3 is limited to First Article Testing and Approval (FATA), which is intended to ensure that the contractor can furnish a product that conforms to all contract requirements for acceptance. *The focus is on the contractor, not the product.* FATA occurs immediately after contract award and almost exclusively prior to the start of production. Since FATA is only intended to ensure that a contractor can produce a quality item, i.e., is capable of producing a quality item, FAR Subpart 9.3 places limitation on the use of first article tests and approval. Specifically, this type of testing and approval may be appropriate when:

- The contractor has not previously furnished the product to the Government
- The contractor previously furnished the product to the Government but:
 - There have been subsequent changes in processes or specifications
 - Production has been discontinued for an extended period of time
 - The product acquired under a previous contract developed problems
- It serves as a manufacturing standard.

On the other hand, the FAR Part 46 focus is on ensuring that the Government implements sound quality assurance policies and procedures. This includes inspections, acceptance, tests, and other measures associated with quality requirements. The

⁴ It is important to note that the FAR places FAT guidance in FAR Part 9, *Contractor Qualifications*, and not in FAR Part 46, *Quality Assurance*. Hence, the FAR does not consider FATA to be a quality assurance technique.

prescribed FAR quality assurance policies and procedures require DLA Aviation to ensure that:

- Contracts include inspections and other quality requirements necessary to protect the Government's interest
- Supplies tendered by contractors meet contract requirements
- Government quality assurance is conducted by Government personnel before acceptance of supplies acquired under Government contracts
- Contracts for commercial items rely on the contractor's existing quality assurance system
- Solicitation and contracts, when appropriate, are to include requirements that contractors implement specific quality procedures to control the quality of the supplies they are providing to the U.S. Government. (DLA Aviation utilizes Quality Control Codes (QCCs) to set contract quality control requirements and to identify appropriate FAR contract clauses.)

Subsequent analyses will show that first article testing is being employed as a quality assurance technique. First article tests are intended, for the most part, to provide an evaluation of the contractor's capabilities to manufacture an item. *They are not intended to be a means to estimate the future quality of products that will subsequently be manufactured.* It is both very high risk and impractical to base quality assurance decisions on first article tests performed on pre-production products. The fact that current practices violate FAR Part 9.3 and FAR Part 46 policies is insignificant compared to the risk being taken by estimating contractors' future quality performance by tests performed on preproduction articles.

3. Analysis of the Relationship Between FAR Subpart 9.3, *First Article Test and Approval*, and DLAI 3200.1, *Joint Engineering Support Instruction*

The purpose of the analysis in this section is to assess the compatibility of FAR Subpart 9.3 and DLAI 3200.1; i.e., are these two documents supportive of each other? FAR Subpart 9.3 was discussed in the previous section. That discussion will be referenced here. As a result, only DLAI 3200.1 will be discussed here.

The Joint Engineering Support Instruction is a joint document to which the Army, Navy, Air Force, and DLA each assigned their own document number once they approved the document. The current version is in effect a draft document since the Army withdrew its concurrence shortly after signing the document. (The document is commonly referred to by its DLA designation – DLAI 3200.1.) DLAI 3200.1 has multiple purposes as conveyed in the document. The two procedures of interest for this analysis are:

- Determining the need for engineering support
- Obtaining engineering support.

Determining the need for engineering support is addressed in an enclosure to the instruction. It states that DLA will use the information in the enclosure to determine when to request engineering support guidance from the cognizant military service's ESA. The enclosure specifies that DLA is to seek guidance on all contractual requirements concerning "testing requirements, waiver of first article testing, and production lot testing." It further specifies that DLA is to request that guidance from the cognizant ESA by submitting DLA Form 339, *Request for Engineering Support*.

ESAs are providing guidance that is compatible with DLAI 3200.1 but, in practice, it generally conflicts with and supersedes FAR first article testing policies and procedures. Based on IDA-conducted interviews in a previous study for Headquarters DLA, the ESAs do not consider FAR policies and procedures when providing that guidance. Further, little or no use is made of DLA data on contractors' past performance when arriving at first article test decisions.

Section D.2 addressed the five FAR Subpart 9.3 circumstances when first article tests may be appropriate. Little or no use is made of FAR policy regarding decisions to conduct first article testing. Once an ESA issues guidance that a first article test is to be performed on an NSN, that information is entered, by DLA Aviation, into the first article test indicator field, found in to the NSN's Material Master in EBS. Currently DLA Aviation has 32,037 NSNs designated as requiring first article tests when they are next procured. That information remains there until a technical-quality specialist removes it. IDA interview data indicate that technical-quality specialists at DLA Aviation are not removing the FAT indicator data once they are entered. As long as those fields indicate that a first article test is required, these tests will be automatically entered on future purchase requests. DLA Aviation does request the ESAs to waiver first article tests in cases where they have been performed within the previous 3 years but with limited success.

The ESAs and DLA Aviation are not complying with FAR policy and procedural guidance with respect to first article tests. This is a direct result of the DLAI 3200.1 procedures. The intent of the FAR is to make available, under certain circumstances, first article testing as a means of evaluating contractors' ability to produce quality items, i.e., a qualification test. The ESAs and DLA Aviation are using first article testing as a means of evaluating products, not contractors.

4. Analysis of the Relationship between DoDD 5105.22, *DLA*; FAR Subpart 9.3, *First Article Test and Approval*; and DLAI 3200.1, *Joint Engineering Support Instruction*

The purpose of the analysis in this section is to assess the compatibility of the FAR Subpart 9.3, *First Article Test and Approval*, and DLAI 3200.1, *Joint Engineering Support Instruction*, with DoDD 5105.22, *DLA*. In Section 4.D.2, FAR Subpart 9.3 was discussed and in Section 4.D.3 DLAI 3200.1 was discussed. The discussions of those two sections will be referenced in this analysis.

DoDD 5105.22 is a DoD directive in which the Secretary of Defense (SECDEF) assigned to DLA its mission, responsibilities, functions, relationships, and authority.⁵ Several parts of that directive are relevant to this analysis. The section on responsibilities and functions states that the Director, DLA shall:

- Provide materiel commodities and supply chain management for items of supply and services that have been determined to be appropriate for integrated management by a single agency on behalf of all the DoD Components.
- Maintain a DoD worldwide distribution system and accomplish all logistics management functions required to ensure responsive, integrated support of the associated logistics requirements of the Military Departments and the Combatant Commands, including item management classification, quality assurance, and engineering support.

DoDD 5105.22 delegates to the Director, DLA the authority to:

Meet the needs of the Military Departments *by conducting, directing, supervising, or controlling all procurement activities* regarding supplies assigned to the DLA for procurement *in accordance with* applicable laws, DoD Regulations, *Federal Acquisition Regulation (FAR)*, and the *Defense FAR Supplement (DFARS)*.

The italics were added by IDA to highlight those parts of the guidance that are most relevant to this analysis.

The above extracts from DoDD 5105.22 illustrate that the Director, DLA is responsible for the integrated management of those weapon system consumable items assigned to DLA under the DoD single item manager policy. That integrated management responsibility includes the integrated support of associated logistics requirements such as quality assurance. The responsibilities and functions section implies that this includes first article testing. That implied responsibility becomes

⁵ Title 10, United States Code, Sections 191 and 193 provide SECDEF with the authority necessary to issue such guidance to the Director, DLA.

explicit when considering the authority assigned to the Director by the directive: conduct, direct, control all procurement responsibilities in accordance with the FAR, DFARS, etc.

DoDD 5105.22 addresses many areas not addressed by the FAR. In those areas that are common to both documents, DoDD 5105.22 requires the Director DLA to conduct DLA operations in accordance with the FAR and DFARS. Hence, DoDD 5105.22 and the FAR are fully compatible not only in regard to first article testing but in all areas common to both documents. As addressed in Section E.3, FAR Subpart 9.3 and DLA 3200.1 are not compatible with respect to first article tests. This applies to the policies, procedures, and practice. Consequently, DoDD 5105.22 and DLA 3200.1 are not compatible with respect to first article testing.

5. Analysis of the Relationship Between First Article Tests and Quality Control Codes (QCCs)

Part 46, *Quality Assurance*, of the FAR prescribes the policies and procedures DLA is directed to implement to ensure supplies acquired by DLA, under Government contracts, conform to the contracts' quality and quantity requirements. The FAR also defines "Contract Quality Requirements" as:

"The technical requirements in the contract relating to the quality of the product *and* those contract clauses prescribing inspection *and* other quality controls incumbent on the contractor, to assure that the product conforms to the contractual requirements."

DLA's approach to ensuring that the products they procure conform to the contractual requirements parallels the approach set forth in the FAR. This approach, DLA's consumable item quality program, consists of three major components:

- DLA prescribes, in solicitations, the quality control standards the contractors must satisfy.
- Contractors implement the contractual quality control standards and accept contractual responsibility for the quality of the products they are producing for the Government.
- DLA prescribes quality assurance methods to be employed during and at the conclusion of production to ensure the products conform to each contract's quality and quantity requirements. DLA also designates the Government agency responsible for performing the quality assurance.

The purpose of this analysis is to assess DLA Aviation's use of QCCs to supplement first article testing in order to increase the probability that items being procured conform to contracts' quality requirements.

DLA Aviation's implementation of the first of the three major components, listed above, involves DLA technical-quality specialists assigning the appropriate QCC to each Purchase Request (PR). The QCC is a three position code that defines the level of quality control required for a specific contract. The first QCC position identifies the intended contract quality requirement; the other positions provide supporting details. QCC contract quality requirements have a one-to-one correspondence with the FAR's four general contract quality categories (see FAR Subpart 46.2). The FAR's four contract quality categories are:

- Contracts for commercial items
- Government reliance on inspection by contractors
- Standard inspection requirements
- Higher-level contract quality requirements.

Once the contracting specialists receive a PR from the technical-quality specialists, the contracting specialists take the assigned QCC and use it to identify the appropriate contract clauses to include in the solicitation.

Table 4-4 shows the distribution of assigned QCCs for all active DLA Aviation contracts during FY 2012. The distribution of QCCs among the four FAR contract quality categories is:

- Contracts for commercial items: 15 percent
- Government reliance on inspections by contractors: 4 percent
- Standard inspection requirements: 32 percent
- Higher-level contract quality requirements: 38 percent
- No QCC assigned: 3 percent.

This appears to be a reasonable distribution of QCCs. A definitive assessment would require a detailed examination of the Federal Stock Classes and the weapon system essentiality codes associated with each contract quality category. IDA did not perform a detailed examination.

Table 4-4. Quality Control Code (QCC) Distribution

QCC Code	1st QCC Position Contract Quality Requirement	2nd QCC Position Quality Subsystem Identification	No. Of QCCs	Percent (%)
BAA	Commercial (Any System)	No Quality Subsystem Req.	56,450	15
CAA	Contractor Responsibility	No Quality Subsystem Req.	13,489	4
DAA	Standard Inspection	No Quality Subsystem Req.	16,491	5
DAB	Standard Inspection	No Quality Subsystem Req.	39,438	11
DCA	Standard Inspection	Measurement and Test Equip.	56,590	16
FAA	Higher Level Quality Control	No Quality Subsystem Req.	5,867	2
FCA	Higher Level Quality Control	Measurement and Test Equip.	54,165	15
FCP	Higher Level Quality Control	Measurement and Test Equip.	48,879	13
FAM	Higher Level Quality Control	No Quality Subsystem Req.	29,684	8
Various	Misc. QCCs; low density		33,195	9
blank	No QCC Specified		10,837	3
Total			365,085	100

Here we examine the relationship between critical items and quality control as defined by QCCs. Table 4-5 shows the distribution of QCCs for active FY 2012 DLA Aviation contracts that required the products to undergo first article testing. The data in Table 4-5 are a subset of the Table 4-4 data. A weapon system item that is designated for first article testing is an indicator that the item is a critical item and requires increased assurance that the item, when procured, conforms to contractual requirements. This makes a strong case for assigning to those critical NSNs a QCC that requires the contractors to satisfy the higher level contract quality requirement, QCC position code one, and also the appropriate quality subsystem identifier, first article test code in QCC position two. The data in Table 4-5 show that only 44 percent of the QCCs were so assigned. However, an additional 10 percent of the items, i.e., with a QCC code of FAA or FAM, were assigned higher level contract quality codes but lacked inclusion of the most suitable quality subsystem identification. The absence of a more systematic process for assigning QCCs has the potential for DLA procuring substandard parts, which tends to negate the intent of the first article testing. A breakdown of the 44 percent figure is:

- KCA: Higher level contract quality – Government first article test requirement 4%
- LCA: Higher level contract quality ISO 9001:2000 – Government first article test requirement 26%
- LCP: Higher level contract quality ISO 9001:2000 – Government first article test requirement 4%
- QHM: Higher level contract quality – contractor first article test requirement 3%

- RCA: Higher level contract quality ISO 9001:2000 – contractor first article test requirement 5%
- RHM: Higher level contract quality ISO 9001:2000 – contractor first article test requirement 3%

However, the correlation between NSNs in Table 4-5 that have been assigned both a higher level QCC code and a FAT subsystem identifier with NSNs that classified as a CAI is only 6 percent. This further indicates that the coordination between first article testing and suitable quality control measures is weak, which detracts from effective quality assurance. It also raises critical item issues: which items are critical items and how are they to be managed? These issues are outside of the scope of this study but need to be addressed.

Table 4-5. QCC Distribution: NSNs That Require First Article Tests

QCC Code	1st QCC Position Contract Quality Requirement	2nd QCC Position Quality Subsystem Identification	No. Of QCCs	Percent (%)
BAA	Commercial Items	No Quality Subsystem Req.	7	0
CAA	Contractor Responsibility	No Quality Subsystem Req.	2	0
DAA	Standard Inspection	No Quality Subsystem Req.	43	0
DAB	Standard Inspection	No Quality Subsystem Req.	105	1
DCA	Standard Inspection	Measurement and Test Equip.	339	3
FCA	Higher Level Contract Quality	Measurement and Test Equip.	551	4
FCP	Higher Level Contract Quality	Measurement and Test Equip.	1,588	11
FAM	Higher Level Contract Quality	No Quality Subsystem Req.	27	0
KCA	Higher Level Contract Quality-GFAT	Measurement and Test Equip.	676	4
LCA	Higher Level Contract Quality-GFAT	Measurement and Test Equip.	3,929	26
LCP	Higher Level Contract Quality-GFAT	Measurement and Test Equip.	620	4
PCA	Standard Inspection-CFAT	Measurement and Test Equip.	2,258	15
QHM	Higher Level Contract Quality-CFAT	Measurement and Test Equip. and CoC	493	3
RCA	Higher Level Contract Quality-CFAT	Measurement and Test Equip.	664	5
RHM	Higher Level Contract Quality-CFAT	Measurement and Test Equip. and CoC	501	3
Various blank	Misc. QCCs; low density No QCC Specified		3,126 41	21 0
Total			14,970	100

Next we take a different look at critical items and quality control. Table 4-6 shows the distribution of QCCs for active FY 2012 DLA Aviation contracts for those NSNs categorized as CAIs. Defining an item as a CAI results in the NSN being classified as, or

considered to be, a critical item. This makes a strong case for assigning to those NSNs a QCC that requires contractors to satisfy one of the higher level contract quality requirements, QCC position code one. The Table 4-5 data show that only 43 percent of the QCCs were so assigned. The absence of a more systematic process for assigning QCCs has the potential for DLA procuring substandard parts. A breakdown of that 43 percent figure is:

- FCA: Higher level contract quality ISO 9001:2000 17%
- FCP: Higher level contract quality ISO 9001:2000 19%
- FAM: Higher level contract quality ISO 9001:2000 7%

Table 4-6. QCC Distribution: NSNs That Are CAIs

QCC Code	1st QCC Position Contract Quality Requirement	2nd QCC Position Quality Subsystem Identification	No. Of QCCs	Percent (%)
BAA	Commercial Items	No Quality Subsystem Req.	33,547	14
CAA	Contractor Responsibility	No Quality Subsystem Req.	6,749	3
DAA	Standard Inspection	No Quality Subsystem Req.	4,189	2
DAB	Standard Inspection	No Quality Subsystem Req.	16,939	7
DCA	Standard Inspection	Measurement and Test Equip.	43,906	19
FCA	Higher Level Contract Quality	Measurement and Test Equip.	38,906	17
FCP	Higher Level Contract Quality	Measurement and Test Equip.	44,226	19
FAM	Higher Level Contract Quality	No Quality Subsystem Req.	17,411	7
Various	Misc. QCCs; low density		26,899	12
blank	No QCC Specified		401	0
Total			233,173	100

6. Analysis of the Use of First Article Test Plans

The purpose of this analysis is to determine if DLA Aviation's first article test plans conform to the test plan requirements described in the FAR.

The FAR addresses first article testing in Part 9, *Contractor Qualifications*, as one of several means for determining if contractors can furnish products that conform to all contractual requirements. First article testing requires the contractor to manufacture and submit first article(s) for testing. A first article can be a preproduction model, initial production sample, test sample, first lot, pilot lot, or pilot model. In order to be able to furnish the required first article the contractor is provided with the product's technical specifications. To assist in providing a *quality* first article, the contractor is also to be given a copy of the Government prepared test plan. The scope of the test plan varies depending on whether the first article test will be a Government FAT or a contractor FAT. Table 4-7 is derived from FAR Subpart 9.306 and defines the scope of or

requirements for the two types of test plans. The DLA Aviation contracting specialists are responsible for including the test plans in both solicitations and contracts.

Table 4-7. First Article Test Plan Requirements

Contractor First Article Testing	Government First Article Testing
1. Performance or other characteristics that the first article must meet for approval	
2a. Detailed technical requirements for tests that must be performed for approval	2b. Tests which the first article will be subject to for approval
3. Necessary data that must be submitted to the Government in the first article approval test report	

Based on IDA-conducted interviews, DLA Aviation practices do not always conform to FAR policy. Generally, solicitations and contracts do not contain the first article test plans. Typically in the case of Government FAT, the testing agency develops the test plan after contract award, usually after receiving the first articles from the contractor. In the case of a contractor FAT, the contractor develops the test plan after contractor award and submits it to the cognizant ESA for approval. The failure to provide the first article test plans in solicitations and contracts partly negates the value of first article tests. A comprehensive test plan identifies the (critical) characteristics that the first article must meet in order to be approved; it supplements the product's technical description. (Technical descriptions should identify the products' critical characteristics but frequently they are not identified.) The failure to include the first article test plans in the solicitations and the contracts is likely a major factor in the high first article test failure rate that DLA Aviation is experiencing: approximately 40 percent.

Headquarters DLA, on August 6, 2014, reissued Directive Type Memorandum (DTM) 13-007, subject: *DLA First Article Requirements and Process Management*. The DTM brought DLA policy in line with the FAR, Subpart 9.3. As such, it required that first article test plans be included in solicitations and contracts. IDA conducted interviews designed to explore the implementation of the DTM. IDA found that it was being implemented only in those situations where the cognizant ESAs supported the DTM, which is very infrequently.

7. Analysis of the Number of Candidate NSNs for First Article Testing

DLA Aviation has supply chain management responsibility for 1,110,362 NSNs. IDA's analysis of those NSNs found 32,073 that the military services had identified as requiring first article testing when being procured. This identification was made by interrogating, in EBS, each NSN's first article test indicator field. The military services requiring first article tests were identified from the weapon system identifier code (WSIC) associated with individual NSNs. These results are graphically displayed in Figure 4-1.

Figure 4-1 shows that 56 percent of the requirements to conduct first article tests result from Air Force guidance. Since DLA prorates the cost of all first article testing across all weapon system consumable items, the operating forces and industrial customers of the other military services are paying for a substantial portion of the cost of Air Force-directed first article tests.

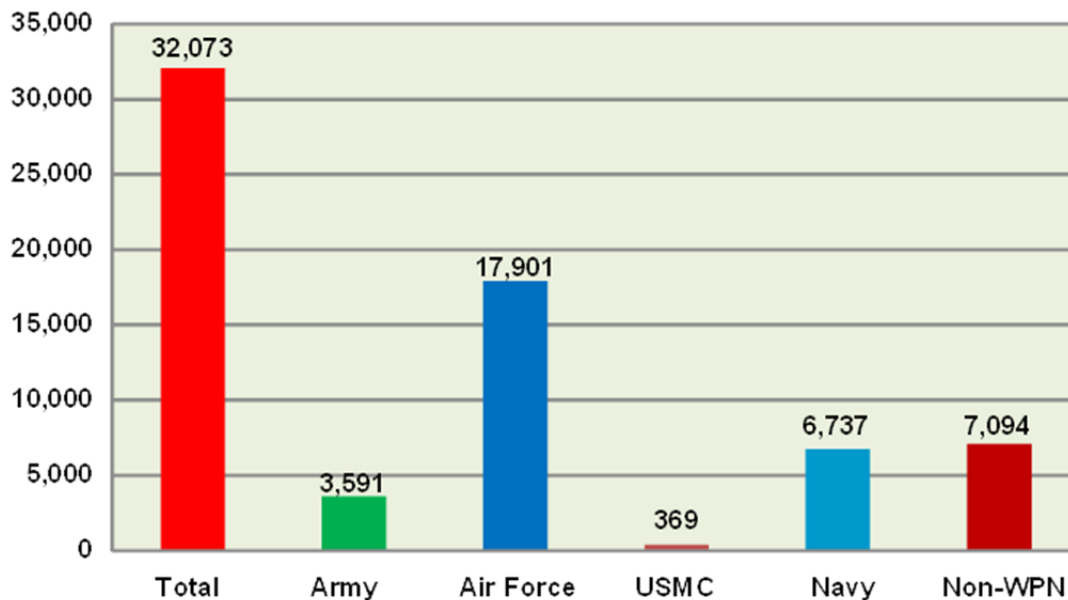


Figure 4-1. First Article Test Coded NSNs by Military Service

The 32,073 NSNs identified as requiring a first article test far exceed the number of tests that DLA Aviation performs annually; in 2012 DLA Aviation performed 2,978 first article tests. As a result, the 32,073 NSNs primarily represent first article tests that will be required to be performed when the items are next procured. This means that first article tests are being associated with the items in question and not the manufacturers or suppliers of those items. This practice is in conflict with the Federal Acquisition Regulation Subpart 9.3, *First Article Testing and Approval*, paragraph 9.303. That paragraph primarily identifies first article tests as being appropriate when there are concerns about the contractor or supplier but not the item itself. In practice, the most impactful policy document addressing FATs is DLA 3200.1, *Joint Engineering Support Instruction*. This document regulates DLA's management of the testing of consumable items. However, it places no FAT constraints on the military services' identification of items to be tested. Therefore, it can be concluded that the 32,073 NSNs identified as requiring first article testing represent an unconstrained set of test requirements. If FAR guidance were followed that number would be significantly reduced.

8. Analysis of First Article Tests in Terms of Acquisition Method Codes/Acquisition Method Suffix Codes (AMC/AMSC)

The purpose of this analysis is to estimate the number of first article tests that would be required if the FAR guidance in Subpart 9.3 were applied. To do this the AMC/AMSC construct was used. AMCs and their related AMSCs are standard FLIS codes that identify acquisition procurement strategies for consumable items. Practically all DLA Aviation supply chain managed NSNs have AMC/AMSCs associated with them. In this analysis, the 32,073 NSNs identified as requiring first article tests were coupled with their assigned AMC/AMSC and overlaid on a standard AMC/AMSC graphic. The left half of Table 4-8 portrays the results of that process.

Table 4-8. AMC/AMSC – First Article Test Graphic

AMSC	AMC=1	AMC=2	AMC=3	AMC=4	AMC=5	AMSC Total	AMSC Explanation	Rationale
A	3	0	7	1	0	11	Governments rights are questionable	Procure Manufacturers Part Number
B	269	11	74	1	1	356	Source Control	Drawing contains Approved sources
C	5960	350	1028	7	1	7346	ESA Approved	Dependent upon contractors quality history
D	0	0	135	5	1	141	Data not available	Procure Manufacturers Part Number
G	18850	1762	0	0	0	20612	Full and Open	Dependent upon contractors quality history
H	545	21	130	0	2	698	Government does not have sufficient data	Procure Manufacturers Part Number
K	281	3	12	1	0	297	Requires class 1A casting	Dependent upon contractors quality history
L	70	2	27	0	2	101	Annual buy value below screening threshold	Procure Manufacturers Part Number
M	534	23	48	1	0	606	Master or coordinated tooling required	Dependent upon contractors quality history
N	6	0	1	0	0	7	Requires special test or inspection facilities	Dependent upon contractors quality history
P	86	7	346	6	0	445	Data rights cannot be procured	Procure Manufacturers Part Number
Q	628	22	217	4	6	877	Government does not have adequate data	Procure Manufacturers Part Number
R	63	4	157	1	0	225	Data not economical to purchase	Procure Manufacturers Part Number
T	224	3	0	0	0	227	QPL	QPL contains approved sources
U	7	0	3	0	0	10	Cost to breakout exceeds projected savings	Procure Manufacturers Part Number
V	3	0	6	0	0	9	Designated high-reliability part	Dependent upon contractors quality history
Y	4	0	5	0	0	9	Design unstable	Dependant Upon Available Data
Z	22	2	7	1	0	32	This item is commercial off the shelf	Commercial item government has no control
AMC Totals	27555	2210	2203	28	13	32009		

The red cells in the AMC/AMSC graphic indicate that, per the FAR, it is inappropriate, in most cases, for the associated NSNs to be subjected to first article testing. The green color coding is consistent with the guidance contained in the FAR Subpart 9.3. The right half of the table, based on the FAR, contains explanatory information and rationale. For example, AMC/AMSC of 1C, above, indicates those 5,960 NSNs should not be subject to first article testing because the sources have previously been “ESA approved.” There may be exceptions: production having been discontinued for an extended period of time; unsatisfactory past performance by a contractor; or if a contractor has not previously furnished the product to the Government.

Table 4-9 summarizes the AMC/AMSC graphic’s data. It shows that 97.4 percent of the 32,009 NSNs are not candidates for first article testing (see Section D-7). Since, as just discussed, there are exceptions, it is more likely that the number of NSNs not requiring first article testing should be reduced to approximately 80 percent⁶ or by 25,500

⁶ The 80 percent figure is an IDA estimate. The 97.4 percent figure in Table 4-9 does not account for the exceptions such as a contractor’s unsatisfactory past performance.

NSNs. This reduces the 32,009 NSNs to approximately 6,400 NSNs that will require first article testing.

In summary, the DLAI 3200.1 guidance results in 32,037 DLA Aviation managed NSNs requiring first article testing while the application of the FAR guidance would eliminate approximately 25,500 of those NSN from requiring first article testing.

Table 4-9. First Article Test Selection Matrix Results

Color Code	No. of FATs in the AMC/AMSC Matrix	Percentage of the Total
Not Appropriate For First Article Tests	31,081	97.4
Appropriate For First Article Tests	928	2.9
Totals	32,009	100.0

9. Analysis of the Cost of First Article Testing

The purpose of this analysis is to examine both the average cost of DLA Aviation first article tests and the associated cost trends. To support this analysis the total number of DLA Aviation first article tests conducted from FY 2009 through FY 2012 were examined, as were the types of tests conducted: Government or contractor first article tests. The examination of the associated test cost data was done at an aggregate level; that is, the analysis did not attempt to study the cost trends of Government FATs and contractor FATs separately. This was, in part, a result of the difficulty in collecting cost data for contractor FATs. More significantly, the cognizant ESA makes the determination regarding the type of test to be performed and then advises DLA Aviation. The type of first article test decision is made independent of any cost considerations, thereby decreasing the utility of analyzing Government FATs and contractor FATs separately.

Figure 4-2 shows the aggregated number of FATs conducted over a 4-year period, i.e., both Government and contractor FATs. From FY 2009 through FY 2012 there was an increase of 183 percent in the number of Government and contractor tests performed. During this period there was a slower growth rate in Government FATs, 153 percent growth, than in FATs in general. Correspondingly, contractor FATs grew at a faster rate, 420 percent growth, than the overall rate.

Figure 4-3 shows the annual cost of first article testing. The cost growth from FY 2009 to FY 2012 was 31 percent. (While not shown in Figure 4-3, the cost of first article tests in FY 2013 rose to \$56.2 million. This reflects a 132 percent cost growth between FY 2009 and FY 2013⁷!) During the period from FY2009 through FY 2012 the average

⁷ Only limited FY 2013 first article test data were not available to include in this study.

cost of a first article test decreased from \$24,519 to \$11,293. The rate of decrease was approximately uniform except for FY 2012, when the rate of decrease dropped off.

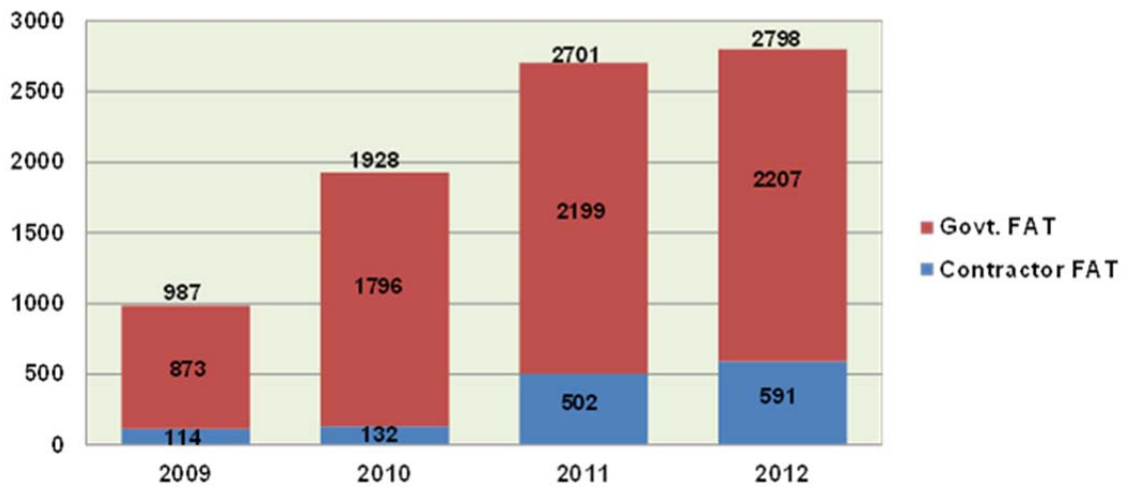


Figure 4-2. Total Number of DLA Aviation Govt. & Contractor First Article Tests FY 2009-2012

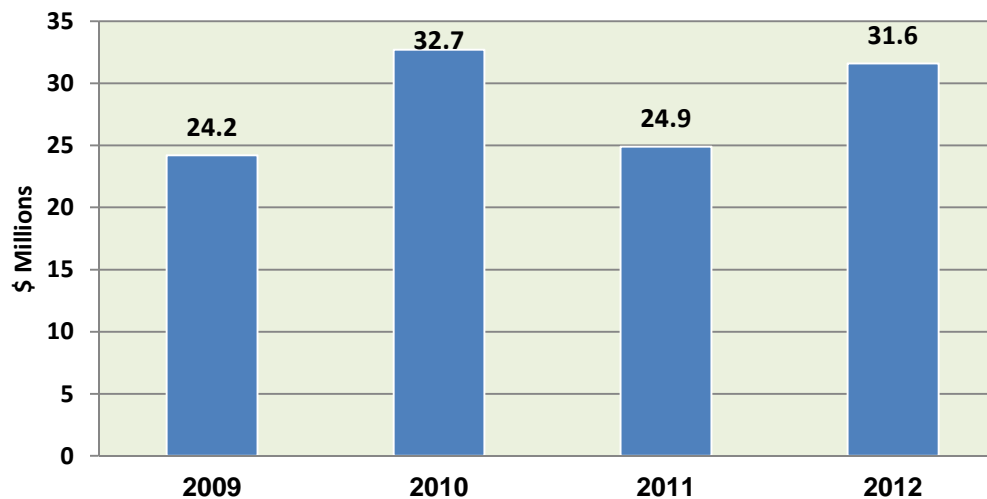


Figure 4-3. First Article Test Costs (\$M)

The analysis reveals that while the average cost of first article tests have been decreasing, the rapid growth in the number of tests per year has offset the decrease in individual test costs. The net effect is an approximately 10 percent annual growth rate in the net first article test costs.

10. Analysis of the Duration of First Article Tests

This analysis was performed to determine the average duration times for both Government and contractor first article tests and approvals. The analysis also addressed,

in a general fashion, the implications of first article test and approval times on the DoD supply chain.

EBS does not calculate the length of time it takes to perform and approve each first article test, nor does it maintain a consolidated or comprehensive history of first article test events. Therefore, it was first necessary to construct that history, to the extent the data permitted, for each first article test performed between FY 2008 through FY 2013. This involved defining the duration of first article tests in terms of data that were available. The resulting errors using the following practical definition are very minimal when compared to the overall test and approval times. The practical definition used was:

Government and contractor first article test: The duration of the test and approval period is the completion date as contained in each NSN's first article test report test data file (ZT test data) minus the contract award date contained in the NSN's Materiel Master. This time interval is then increased by five days to account for the estimated time it takes for procurement specialists to notify the contractors of the results of the first article tests and approvals.

In cases where first article tests resulted in a failure and are subsequently retested, these retests were treated as separate tests for the purpose of computing average first article test duration times. The FAT test report date for each NSN, as contained in the ZT test data file, and the award date, as contained in an NSN's Materiel Master. These dates need to be correlated. The two files were linked by comparing their respective Procurement Instrument Identification Number (PIIN) contained in both files. This resulted in 10,374 matches; FAT data in both the ZT test data file and the NSN's Materiel Master were both complete and accurate.

The results of this analysis of 10,374 first article tests found that the average overall duration period of a test and approval period was 397 days. In the case of the 8,576 Government FATs analyzed, the average duration was 409 days; for the 1,798 contractor FATs analyzed, the average time interval was 342 days.⁸

The 300 to 400 day time duration experienced by those NSNs that undergo first article testing results in the effected NSNs becoming long term backorders or long term unfilled orders (UFOs). This can have serious implications for the materiel readiness of those weapon systems that utilize NSNs that are required to undergo first article testing and also it has serious cost implications for DLA: increased stockage costs. In the case of non-stockage items, the long duration time means that the operational forces and industrial customers that submitted requisitions for those items that require FATs will, on average, have to wait well in excess of 1 year to receive the requisitioned weapon system

⁸ The cause for the differences in the average time duration of GFATs and CFATs was not examined since the time durations were considered to be excessive for both types of testing.

repair parts. If these NSNs are stockage items, the requisitioning operational forces and industrial customers will likely receive them sooner. However, the quantity of items that DLA will be required to stock will be increased due to the long first article test and approval times. This will result in increased DLA stockage costs. These negative impacts stem directly from a characteristic of first article testing: all tests and approvals must be satisfactorily completed before production can start. First article test and evaluations are not normally performed concurrently with manufacturing.

11. Analysis of the Impact of First Article Tests on Procurement Lead Times (ALTs and PLTs)

First article test and approval impacts the two components of procurement lead times: administrative lead times (ALTs) and production lead times (PLTs). This section will analyze the factors affecting both the ALTs and PLTs.

The standard set of DLA Aviation first article test activities, in accordance with FAR Subpart 9.3, that contribute to ALTs are:

- Research contract histories, Product Quality Deficiency Reports (PQDRs), etc., as part of pre-contract award activities associated with NSNs that are candidates for FATs
- Evaluate the need or requirement for a first article test
- Identify FAT-selected NSNs using the items' Material Master
- Define the NSN's FAT characteristics in the Material Master, i.e., number of test units, test location, test item disposition, etc.
- Insert the appropriate first article test contract clauses into the solicitation.

This list of DLA Aviation activities, in practice, has been abbreviated. The DLAI 3200.1, *Joint Engineering Support Instruction*, assigns the responsibility for selecting NSNs that require first article testing to the military services' ESAs.⁹ As a result, DLA Aviation's pre-contract first article test activities are reduced to entering the required first article test data in the designated NSN's Material Master and including the appropriate contract clauses in solicitations. If the FAT data do not exist when a PR is initiated, this adds to the elapsed time it takes to perform the various pre-contract first article test activities. However, if the first article test indicator in the Material Master, to include the supporting FAT characteristics data, is complete then the ALT is negligible. On the other hand, if the FAT characteristics data are incomplete, then a DLA form 339, *Request for*

⁹ In accordance with DLAI 3200.1, *JESI*, Enclosure 3, *Contractual Requirements* category, DLA is required to obtain approval from the cognizant ESA before placing test requirements or waivers for first article testing or production lot testing in a solicitation or a contract.

Engineering Support, must be sent to the cognizant ESA. In general this will add an additional 35 to 50 days to the ALT.

In the last section, the average PLT times for first article tests were found to vary greatly depending on the type of first article test performed. The average PLT for Government FATs is 409 days and for contractor FATs it is 342 days, a spread of 62 days. There are six major activities associated with first article test PLTs; they are:

- Manufacturing the first article test samples
- Developing a test plan
- Testing the samples
- Writing the test report
- Evaluating the test results
- Notifying the contractor of the evaluation.

Unfortunately data do not exist that would permit a quantitative analysis of those six activities. However, based on interviews, useful qualitative data concerning the development of test plans emerged. Test plans, according to the FAR, are to be developed during the pre-contract award process and the solicitation is to include “The tests to which the first article will be subject for approval.” This is not being done by the military services’ ESAs and DLA Aviation. The direct impact on PLT of developing the test plans after contract award is probably slight. However, failure to inform offerers, during the bidding process, of the tests that will be performed on those items that require first article tests is very likely a major contributor to the approximately 40 percent first article test and approval failure rate. Test failures, in all cases, significantly increase PLTs.

12. Analysis of the Impact of First Article Tests on Backorders

The purpose of this analysis is to determine the effect of first article tests on backorders. Figure 4-4 details the number of UFOs for DLA Aviation over a 21-month period. Specifically, the figure shows that DLA Aviation has experienced approximately 40,000 aged or long term backorders over that 21 month period. Their goal is no more than 20,452 long term backorders.

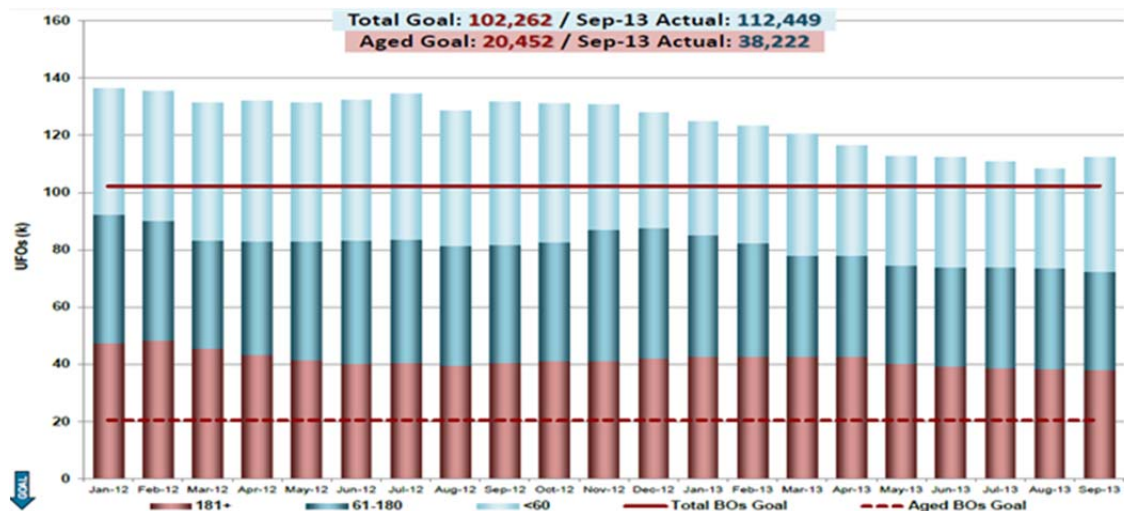


Figure 4-4. DLA Aviation Backorder (BO) Status

The average PLT for Government and contractor first article tests is 409 and 342 days, respectively (see Section D-10). Hence, practically all NSNs that undergo a first article test and approval will result in a long term backorder: a backorder that is in excess of 180 days.¹⁰ This raises the issue of what percentage of long term backorders are a result of first article tests. Figure 4-5 shows that 15 percent, 527 NSNs, of a set of 3,581 long term backorder NSNs resulted from first article testing.

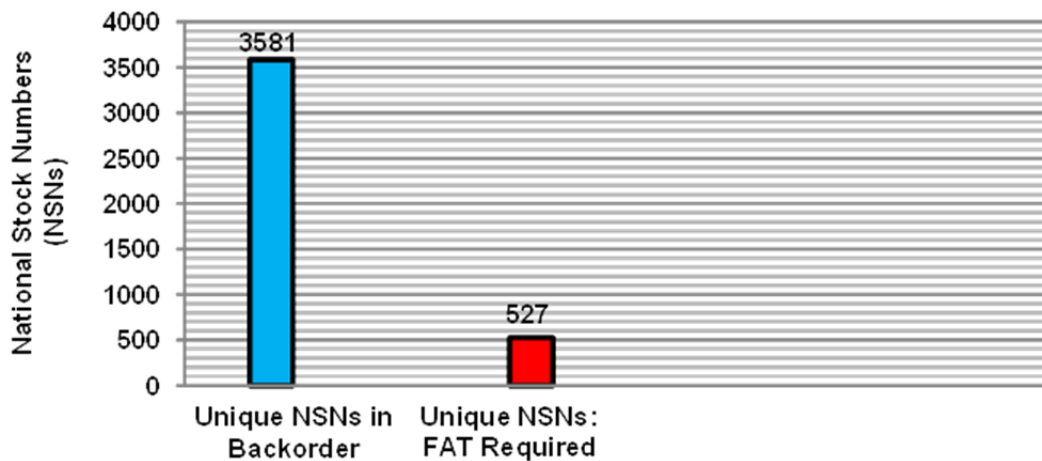


Figure 4-5. First Article Test – Backorder Relationship

The 3,581 unique NSNs are comprised of both DLA Aviation supply chain stockage and non-stockage unique NSNs,¹¹ which belong to a critical set of Federal Stock Classes

¹⁰ An analysis of 10,336 first article tests revealed that 89 percent required more than 181 days to be completed. That percentage becomes greater than 98 percent when production times are considered.

¹¹ “Unique NSN” refers to a backordered NSN for which there may be multiple unfilled orders or requisitions contracts but the NSN is only counted as being in backorder one time.

(FSCs)¹². These NSNs were extracted from the DLA Aviation backorder report for June 24, 2013, and they were all on active contracts. These data was used in the extensive analysis of backorders presented in Chapter 6 (see Table 6-3).

This analysis shows that first article tests have a significant but not dominant impact on long term backorders. The UFOs, i.e., NSNs, used to construct Figure 4-4 are non-unique NSNs whereas Figure 4-5 was constructed using unique NSNs. If the 527 NSNs listed in Figure 4-5 that had undergone first article testing were reconverted from unique to non-unique NSNs, they would account for approximately 10,000 of DLA Aviation's long term backorders. If those first article tests and approvals were not necessary, DLA Aviation's long term backorders would be decreased from approximately 40,000 to 30,000 UFOs, a 25-percent decrease.

13. Analysis of DLA Aviation's Use of Government Contract Quality Assurance (GCQA)

The purpose of quality assurance in Government contracts is to ensure the Government acquires quality products: items that conform to all of the technical specifications contained in the contracts. It is an alternative to first article testing and is far more effective. Procuring quality products begins by including the appropriate contract quality requirement in all solicitations and contracts. FAR Subpart 46.2 contains four general contract quality requirement categories, depending on the extent of quality assurance needed by the Government for a particular acquisition. These sets of contract quality requirements were analyzed in Section D-5 and repeated below.

- Contract for commercial items
- Government reliance on inspection by contractor
- Standard inspections
- Higher-level contract quality requirements.

To ensure the procurement of quality products, these four contract quality requirement categories need to be supplemented by one of two different types of GCQA: GCQA at source (FAR Subpart 46.402) and GCQA at destination (FAR Subpart 46.403). Typically, GCQA at the destination is sufficient to monitor the first two contract quality requirement categories i.e., commercial items and contractor inspections, and possibly the standard inspection category; these require no technical inspections and are limited to examinations of type and kind, quantity, transit damage, and packaging. GCQA at source is necessary when procuring items that have been assigned higher-level contract quality

¹² Critical FSCs are a set of FSCs that collectively contains in excess of 50 percent of the long term backordered NSNs.

requirements, i.e., critical items. It may also be necessary for items that have been assigned a contract quality requirement of standard inspection.

The Defense Contract Management Agency (DCMA), when tasked by DLA Aviation, performs the function of the Contract Administration Officer (CAO). This includes performing quality assurance functions. Specifically, this includes the following QA functions, per FAR Subpart 42.302:

- Ensure contractor compliance with contractual quality assurance requirements (see FAR Part 46).
- Perform engineering surveillance to assess compliance with contractual terms for schedule, cost, and technical performance in the area of production.
- Perform production support, surveillance, and status reporting, including timely reporting of potential and actual slippages in contract delivery schedules.
- Review and evaluate preservation, packaging, and packing.

The performance of these functions along with the assignment of the appropriate contract quality requirement, and GCQA at destination, provides the Government with a strong quality assurance program and significantly increases the likelihood that the Government will receive quality products. However, DFARS Subpart 246.402, *Government Contract Quality Assurance at Source*, restricts GCQA for contracts or delivery orders valued below \$300,000. Regarding consumable items, there are exceptions to the DFARS Subpart 246.402 guidance: the product being acquired has critical characteristics or special acquisition concerns.

These critical characteristics or special acquisition concerns are conditions that require in-plant surveillance as part of an effective GCQA program. Currently, DLA Aviation is making very limited use of DCMA to perform GCQA for items possessing higher-level contract requirements.¹³ The failure to use DCMA more extensively to perform GCQA, including in-plant surveillance, primarily stems from DCMA's limited personnel resources. Another likely reason could be the over-classification of critical items, i.e., Critical Application Items (CAIs). In 2012, DLA Aviation had 365,085 active contracts and according to DLA Aviation's coding, 72 percent of the contracts were for items categorized as CAIs. An additional 4 percent of active contracts were of items coded as Special Procedures Category (SPC) items, which include Critical Safety Items (CSIs). Then, by summing CAI and SPC coded items, 76 percent of 2012 procurements were for critical items and required QA at the source and possibly in-plant surveillance. It should be noted that DLA Aviation's large number of critically coded

¹³ Technical-quality specialists are required to develop and issue a formal Quality Assurance Letter of Instruction (QLAI) if DCMA is to provide GCQA support and in-plant surveillance.

items seems incongruent with the FAR's definition of "special situations." DLA's policy of critical item coding was addressed in Chapter 3, Sections D-10 through D-12.

In summary, DLA Aviation's GCQA program is not functioning in a manner intended to ensure that Government-procured consumable items conform to their technical specifications nor does the program conform to the intent of FAR Part 46, *Quality Assurance*.

14. Analysis of DLA Aviation's Implementation of DTM 13-007, *DLA First Article Requirements and Process Management*

The purpose of DLA's directive-type memorandum, DTM-13-007,¹⁴ is to establish DLA policy and procedures for "evaluating and accepting Engineering Support Activity (ESA) imposed first article test requirements." The memorandum reinforces FAR Subpart 9.3 guidance on first article testing and also supplements it by including relevant implementation guidance, e.g., DLA will not accept test requirements that are not defined within the TDP. As such, the DTM is compatible with DoDD 5105.22, *DLA*, which requires DLA to comply with FAR guidance. However, this approach to first article testing conflicts with both ESA prerogatives and the intent of DLAI 3200.1, *Joint Engineering Support Instruction (JESI)*. The DTM attempts to overcome or minimize this issue by relying on the *JESI* governance process to resolve "the balance of risk issues," i.e., *JESI* conflict resolution procedures.

DLA Aviation's technical-quality personnel have attempted to implement the DTM, but with minimal success. The ESAs do not recognize the validity of the DTM, since it is a DLA document, and therefore they will generally not cooperate in implementing it. Based on IDA-conducted interviews, the technical-quality personnel eventually comply with ESA guidance vice DLA guidance if the ESAs will not support their efforts to implement the DTM. IDA did not come across a single case in which technical-quality personnel used the *JESI* conflict resolution procedures to resolve implementation issues. Anecdotally related to the resolution of DTM implementation issues is the concern on the part of technical-quality personnel that DLA/DLA Aviation will not support them if they elevate first article test issues.

E. Assessment

There exists a wide variance between the FAR's quality and first article testing policies, i.e., contractor qualification and quality assurance policies versus DLAI 3200.1's approach to quality and first article testing. Quality considerations will form an essential part of this analysis since a primary function of testing is to evaluate the quality

¹⁴ DTM 13-007 expired on August 6, 2014. Its content is being incorporated into a DLA instruction.

of Government-procured products; *testing and quality considerations are inseparable*. The utility of both sets of policies will be assessed in this section from the perspective of performance and the utility of first article testing. First, performance will be assessed using the results of the analyses described in Section D, above, and the DLA vision statement, an evaluation metric.

The new millennium brings dramatic changes to the future battlefield and how we [DLA] conduct [logistics] operations across the entire spectrum of war. The challenge is to provide:

- The right item,
- At the right time,
- At the right place, and
- At the right price every time in this new environment.

The utility of the two sets of policies will then be assessed also using the results from the previous analyses and by applying industry and academia accepted quality and quality assurance norms and practices.

1. Assessment of First Article Test Performance

DLA Aviation's administration of first article tests conformed to DLAI 3200.1 policies and procedures guidance. This resulted in DLA Aviation contracting for an average of 2,100 first article tests per year over a recent 4-year period, with the number of tests increasing in each of those 4 years. These first article tests delayed the start of manufacturing by an average of 396 days per item, and resulted in a corresponding increase in PLTs (see Section D-10). The time for manufacturers to deliver items will be longer when first article tests are required since production does not start until the first articles have successfully completed testing. The associated ALT increases, on average, are minimal when compared to PLTs. However, outliers may individually increase ALTs by 50 to 100 days (see Sections D-10 and 11). There are two very significant consequences to these 1 year plus add-ons to procurement lead times for FAT required items. First, this is an extremely long wait time for the military services' industrial customers and operational forces whose normal activity cycle time is far shorter. These problems may be mitigated if the items in question are stockage items. (Approximately 25 percent of DLA Aviation's consumable item lines are stockage lines, and they typically have high fill rates.) However, these very long PLTs associated with FATs drive up the required stockage levels for those stockage items (see Section D-12). This in turn drives up overall DLA Aviation stockage costs. The number of FATs conducted has increased by 186 percent from 2009 through 2012, with a corresponding 31 percent increase in FAT costs. DLA Aviation is spending approximately \$30 million annually on

first article testing (see Section D-9). These cost figures do not include the increased cost of stockage.

Using the DLA vision statement as a metric, it follows that that first article test practices being employed by DLA Aviation and the ESAs, while in accordance with DLAI 3200.1, are preventing DLA Aviation from providing those items *at the right time* and *at the right price*. Regarding the right price, it is important to realize that the cost of first article tests and the cost of increased stockage levels incurred by DLA are ultimately recovered by DLA. These costs are recovered by increasing the cost of the consumable items that it sells to its industrial customers and operational forces; this is accomplished through the application of cost recovery rates, i.e., surcharges, to the sales price of consumable items.

Since DLA Aviation and the ESAs primarily avoid implementing the FAR's first article test policies and procedures, there exist no corresponding performance data to assess. However, since the FAR places strict limits on the use of FATs, it is reasonable to assume that if FAR first article test policies and procedures were implemented, the number of FATs conducted would be greatly reduced. The analysis performed in Section D-8, which is based on FAR policy, estimates that the number of FATs could be reduced by approximately 80 percent. This would significantly reduce customer wait times, decrease the number of DLA Aviation long term backorders, reduce FAT costs, and decrease procurement lead times.

2. Assessment of the Federal Acquisition Regulation's Approach to Quality

DoDD 5105.22, *Defense Logistics Agency*, directs DLA to procure items of supply in accordance with applicable laws, DoD Regulations, the FAR, and the Defense FAR Supplement (DFARS) (see Section D-4). The FAR sets forth a comprehensive approach to quality, which includes the selective use of first article tests. This approach is intended to ensure that supplies acquired by Government contracts conform to the contracts' quantity and quality requirements. It also provides contracting officers with the flexibility necessary to accommodate the varying levels of quality assurance needed by the Government (see Section D-5).

FAR policies and procedures prescribe the use of quality-related considerations beginning with the solicitation phase of an acquisition. Specifically, FAR Part 9, *Contractor Qualifications*, prescribes policies and procedures that are intended to ensure a potential contractor or contractor *can furnish* a product that conforms to all of the contract's requirements for acceptance (see Section D-2). FAR Part 9 authorizes the use of several procedures that are intended to determine if a potential contractor or contractor is qualified (see Table 4-3). First article testing is one of those procedures and its application is described in FAR Subpart 9.3, *First Article Testing and Approval*. The FAR limits the use of first article testing by focusing the testing on a limited set of

circumstances, e.g., the contractor has not previously furnished the product to the Government. It further limits the scope of this type of testing to performance or other characteristics that the first article *must meet* for approval (see Section D-2). As will be discussed in Section E-3, below, the FAR guidance on first article testing is not, for the most part, being adhered to by the ESAs and DLA Aviation.

FAR policies, as stated in FAR Subpart 46.102, address the use of quality assurance during the performance of a contract (see Section D-2). Specifically, contracting agencies are to ensure that:

- Government contract quality assurance is conducted before acceptance
- Quality assurance and acceptance services of other agencies, [e.g., Defense Contract Management Agency] are used when this will be effective, economical, or otherwise in the Government's interest.

The application of these FAT policies is intended to be prescriptive, based on the extent of quality assurance that the Government requires. This involves the contracting agency selecting one of four types of contract quality requirements that the contractors must comply with: contracts for commercial items, Government reliance on inspection by contractor, standard inspection requirements, or higher-level contract quality requirements (see Section D-5). DLA Aviation regularly applies this FAR type-of-contract-quality-requirement policy via its application of Quality Control Codes (QCCs). However, the application of these codes with respect to "critical" items is inconsistent. Fewer than 50 percent of the DLA Aviation managed "critical" items are assigned a higher-level contract quality requirement code applicable for complex or critical items (see Section D-5).

Complementing the contract quality requirement policy is the application of quality assurance surveillance. FAR Subpart 46.4 states that:

Government contract quality assurance shall be performed at such times and places as may be necessary to determine that the supplies conform to contract requirements. Quality assurance surveillance plans should be prepared in conjunction with the preparation of the statement of work.

DFARS expands on that FAR guidance. It restricts the use of Government contract quality assurance at the source to contracts valued at or above \$300,000, unless the product has critical characteristics or specific acquisition concerns. DLA Aviation-managed consumable items that are critical, e.g., critical safety items, critical application items, first article test items, satisfy the requirement for performing Government contract quality assurance at the source (see Section D- 13). DLA Aviation is not, for the most part, in compliance with the policy. This non-compliance could have serious repercussions with respect to weapon systems' safety and operational considerations.

Headquarters DLA, with the issuance of DTM 13-007, addressed DLA first article requirements and process management. This DTM aligned DLA first article test policies and procedures with FAR Subpart 9.3. The implementation of the policy is problematic, since most ESAs do not agree with the policy contained in the DTM, and DLA Aviation technical-quality personnel are reluctant to enforce the policy or challenge ESAs' first article test guidance (see Section D- 14).

In summary, FAR Part 46, *Quality Assurance*, sets forth a comprehensive approach designed to ensure that the Government receives quality products. This is a balanced approach that relies on (1) quality control (QC) to ensure products are being manufactured in accordance with the item's technical specifications, (2) quality assurance (QA) to ensure sound quality practices are in place and being utilized, and (3) acceptance procedures designed to detect nonconforming products. The FAR approach to quality conforms to quality norms being employed by leading industries.

Policies and procedures in FAR Part 9, *Contractor Qualifications*, complement FAR Part 46 in that they are intended to be used to qualify contractors, generally prior to the start of production. FAR first article test policies are not being followed with respect to qualifying contractors, except for qualifying new sources. DLA Aviation is including contract quality requirements in almost all of their contracts in order to ensure the contractor implements the appropriate level of QC. However, DLA Aviation is being far too lenient in the assignment of contract quality requirements for critical items. Finally, DLA Aviation is remiss in not systematically tasking DCMA to perform quality assurance [in plant] surveillance of critical items during their manufacture. There is, however, a mitigating factor: DCMA's quality assurance workload is already at or near capacity (see D-13).

3. Assessment of the DLAI 3200.1 Approaches to Quality and First Article Testing

Table 4-10 summarizes the DLAI 3200.1 approach to first article testing and quality. The categories listed in the table encompass both DLAI 3200.1 and FAR quality and first article test categories. Quality and first article testing have been combined in this table since the FAR identifies first article testing as contributing to the quality of a product. This does not conflict with DLAI 3200.1 practices.

Table 4-10. DLAI 3200.1 Approaches to Quality & First Article Testing

Quality & FAT Categories	DLAI 3200.1 Policies and Procedures	Practices	Analysis Reference
Purpose of FAT	Test items' conformance to tech specifications	N/A	Section D-3
Selection of FAT Items	Selection done by ESAs	No documented practices	Section D-7 and D-3
First Article Test Plans	No guidance	No uniform practices	Section D-6
Contract Quality Requirement Guidance	ESAs responsible for establishing or approving these contract quality requirements.	DLA Aviation independently establishes the contract quality requirements via QCCs	Section D-5
Government Quality Assurance at Source	No guidance	DLA Aviation makes the determination. Not typically selected.	Section D-13
Government Quality Assurance at Destination	No guidance	DLA Aviation makes the determination	Section D-13

The purpose of first article testing is not addressed in DLAI 3200.1, *Joint Engineering Support Instruction for Items Supplied by DLA*. The Instruction “establishes policy, assigns responsibilities, and defines the process for engineering support provided to DLA by the military services.” The instruction also sets forth a number of procedures and defines the responsibilities of both the DLA and the military services. It makes no reference to the FAR and DFARS and their applicability to engineering support. Regarding quality issues and first article tests, it specifies only the circumstances or situations for which DLA *must* request engineering support from the cognizant military service ESA. The ESAs are required to provide that engineering guidance and DLA, in turn, is required to follow it (see Section D-3). Specifically, it requires DLA supply centers to request engineering support using the automated 339 processing system. In the case of contractual requirements, DLA is to seek engineering guidance when the following circumstances or situations occur:

- Specify or modify testing requirements
- Waiver of first article testing
- Require Production Lot Testing (PLT), and/or
- Specify contract quality requirements.

These requirements apply to all DLA-managed consumable items used on weapon systems: over 90 percent of all consumable items. The instruction contains no procedures or guidance to govern the ESAs' development of that engineering support guidance.

DLA Aviation to a large extent complies with the above listed requirements, except for some the contract quality requirements.

DLAI 3200.1 contains no guidance on the selection of items that require first article testing. DLA Aviation currently has 32,037 NSNs identified as requiring first article testing when next procured. Given the absence of constraints placed on the ESAs, the first article testing requirement represents an unconstrained requirement (see Sections D-7 and D-3). This unconstrained approach to testing sends strong signals that first article testing is primarily being employed as a quality assurance technique. Except when first article testing is being used to qualify new sources, the current DLAI 3200.1 and its related engineering practices conflict with FAR guidance.

DLAI 3200.1 does not address first article test plans (see Section D-6). In practice, test plans are normally developed after contract award and during the preparation period for first article testing. One of the FAR objectives related to Government-developed first article test plans is not realized: assisting the contractor in identifying critical characteristics the first article must meet to be approved (see Section D-7). In the case of contractor first article testing, the FAR objective is realized but it often involves a time consuming process, a trial and error process the contractor goes through to get the test plans approved by the cognizant ESA.

DLAI 3200.1 contract quality requirement guidance, in general, is not being followed by DLA Aviation. A review of QCCs assigned to DLA Aviation-managed NSNs shows they are making contract quality control decisions, apparently without seeking ESA guidance (see Section D-5). Assigning QCCs to a pending procurement is an essential first step in developing an effective Government quality assurance plan for a pending procurement. As discussed in Section D-5, above, there is room for improvement in the selection of suitable QCCs in support of critical item procurements.

Government quality assurance at source is most appropriate when the Government is procuring critical items. In those cases, Government quality assurance should involve *in-plant surveillance* during the entire manufacturing process, as well as acceptance of the manufactured items at the source by the Government (see Section D-13). In-plant surveillance is a time consuming task that the Defense Contract Management Agency is best suited to perform. DFARS Part 246.4, *Government Contract Quality Assurance*, limits in-plant surveillance to contracts valued at or greater than \$300,000, except for products that have critical characteristics or specific acquisition concerns, i.e., critical items. DLA Aviation is not making full use of this option (see Section D-13). In the case of non-critical items, Government quality assurance at destination is appropriate and it is typically limited to inspection of the type and kind of item, quantity, damage, and packaging per FAR Subpart 46.4. DLA Aviation makes extensive use of quality assurance at destination.

In summary, the current approach to quality and first article testing—the DLAI 3200.1 approach—is attempting to ensure the Government is procuring quality items by solely relying on first article testing, e.g., 32,000-plus DLA Aviation NSNs designated as requiring FAT. DLAI 3200.1 is treating first article testing as a quality assurance technique; in fact, the only quality assurance technique that is necessary. In practice, there is no emphasis by the ESAs on providing contract quality requirements or requiring Government quality assurance at the source. (In reality, these functions are best performed by DLA supply centers and not the ESAs.) This set of quality and first article testing practices can best be summed up as attempting to *test in quality* (See Figure 4-6).

Test in quality is a process used to “add” quality into a product after it has been produced. *Test in quality* really means test and then fix the deficiencies—a time consuming and costly process. As discussed in Section E-1, above, efforts to *test in quality* add in excess of 1 year to the production time, and contribute to long term backorders (see Section D-12). In the case of DLA Aviation consumable items, the *test in quality* approach is even more challenging: it is attempting to “add-in” quality, by testing, to a product that has not yet been production line-produced. William Edwards Deming¹⁵ stated, “You cannot inspect quality into a product.” **The DLAI 3200.1 approach to quality relies on first article testing, and it will and has led to quality problems.** However, the use of first article testing to qualify a new contractor is a valid use of FATs since its focus is on the contractor’s capabilities, and not the subsequent quality of the manufactured products.

¹⁵ William Edwards Deming (October 14, 1900 – December 20, 1993) was an American engineer, statistician, professor, author, lecturer, and management consultant. He is best known in the United States for his 14 Points (Out of the Crisis, by Dr. W. Edwards Deming, Preface) and his system of thought he called the “System of Profound Knowledge.”

Current Situation

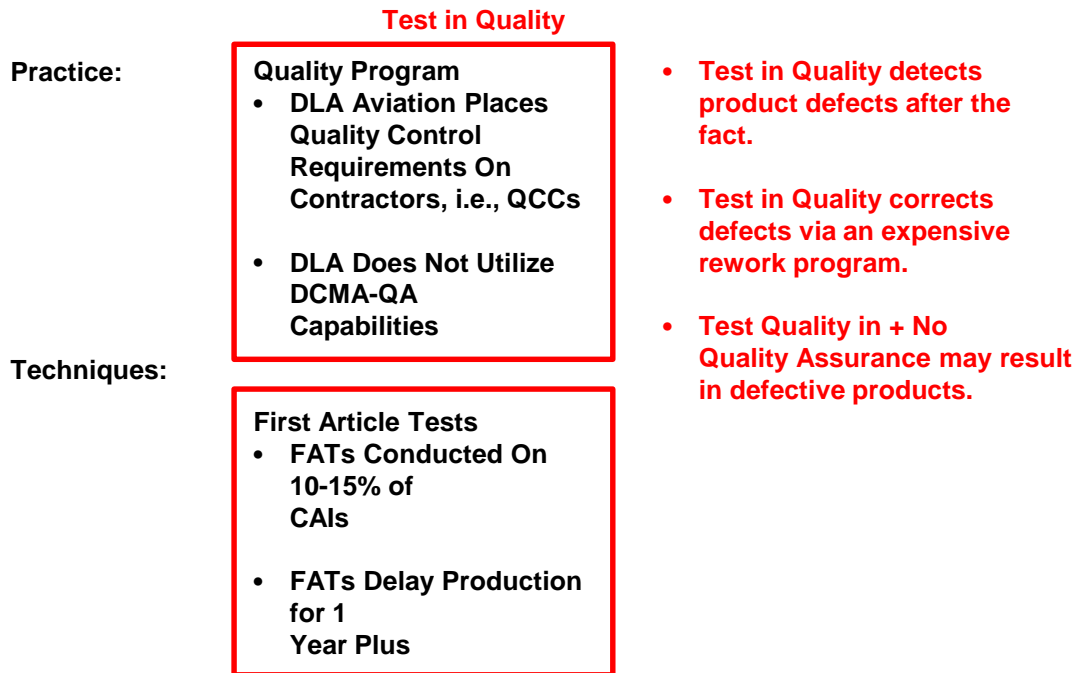


Figure 4-6. Current Situation: Quality and First Article

F. Conclusions

The above analyses and assessment showed that DLA Aviation and their ESA partners are placing very heavy reliance on first article testing to ensure Government procured consumable items are quality products, products that conform to their contract's technical specifications. The assessment also demonstrated that current practices are quite time consuming and yield questionable results: approximately a 40 percent first article failure rate, increasing the number of long term backorders, etc.

The sponsor's guidance to significantly reduce the time and cost associated with first article tests in no way detracts from the Government's overriding objective to procure quality products. There are better and faster ways to realize the Government's objective to procure quality products.

The better way is to *build in quality*. This approach to procuring quality products is fully compatible with the FAR, the DFARS, and DoDD 5105.22 guidance. With respect to Government contracts, *build in quality* is a strategy that minimizes the need for Government and contractors to perform "after the fact" inspections, but rather relies on the contractors to control and efficiently manage their manufacturing process variables i.e., receipt of raw materials, equipment calibration, etc. That is, contractors, not the Government, are responsible to *build quality into* their products. The Government, in this case DLA Aviation, has a critical role with respect to ensuring that contractors *build in*

quality. This requires that DLA Aviation undertake a specific set of coordinated actions. Initially, DLA Aviation, based on the criticality and complexity of an item, needs to establish the suitable *build in quality* requirement. It does this by selecting the appropriate QCC and the associated QCC contract clauses and subsequently including them in solicitations and contracts. Secondly, in the case of critical items, DLA Aviation also needs to task the DCMA to provide in-plant surveillance of the implementation of contractors' quality system, e.g., ISO 9001. Finally, DLA Aviation needs to provide DCMA with the authority to have Production Lot Testing (PLT) performed when appropriate. The selection of suitable QCCs, the tasking, when appropriate, of DCMA to perform in-plant quality assurance, and the option to conduct PLT when circumstances warrant, must be combined in a coherent and integrated manner based on a level of risk the Government is prepared to accept—a risk that a product may not satisfy all of its technical specifications.

Figure 4-7 illustrates the *build in quality* construct. The *build in quality* construct is a practice accepted by leading industries such as Boeing, specifically the Boeing Production System. The foundations for build in quality are based on Dr. Deming's research in the 1940s and 1950s.

As the figure shows, it will be necessary to significantly reduce the number of first article tests currently being conducted. The *build in quality* process does this by limiting the use of first article testing to those situations that conform to FAR Subpart 9.3 guidance, e.g., to qualify new contractors. The actual procedures for controlling the number of first article tests relies on strictly enforcing FAR guidance, strictly enforcing DTM 13-007 FAT procedures, and simultaneously employing the AMC/AMSC FAT management technique to help evaluate first article test requests (see Sections D-8 and D-14).

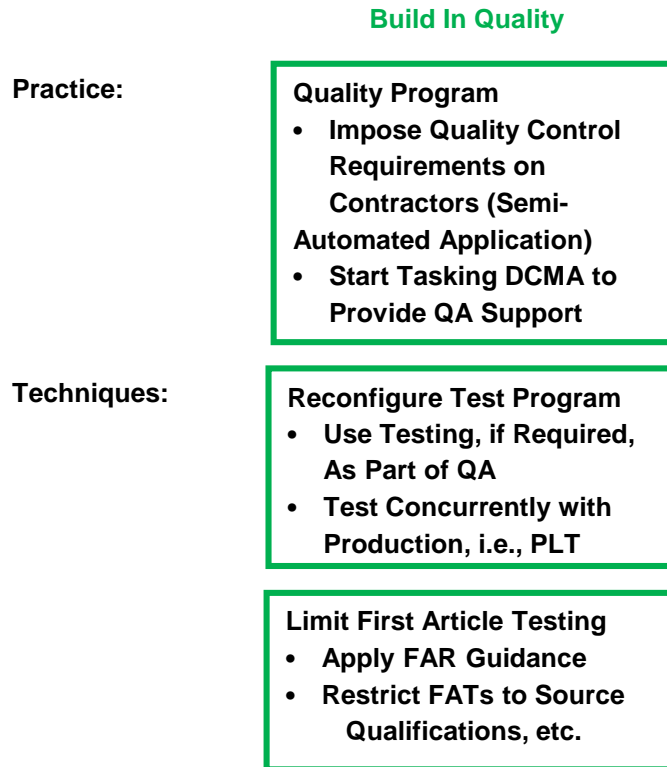


Figure 4-7. Build in Quality Construct

G. Recommendations

The following recommendations are designed to implement the *build in quality* construct. They are also intended to significantly reduce the number of first article tests DLA Aviation is required to perform. The impact of implementing these recommendations will be an increase in the numbers of consumable items being procured that conform to their technical specifications, significantly decreasing procurement lead times, and reducing testing and stockage costs.

Recommendation 1: Implement an aggressive quality control program that conforms to FAR Subpart 46.2, Contract Quality Requirements:

- DLA should cancel DLAI 3200.1, *Joint Engineering Support Instruction*.
- DLA Aviation should assign contract quality requirements to all solicitations for items possessing a Weapon System Designator Code (WSDC).
- DLA Aviation should assign higher-level contract quality requirements and standard inspection requirements to all solicitations for items classified as CAIs, SPCs, or requiring a first article test; assign the appropriate QCCs.
- The definition of selected QCCs should be modified to include Production Lot Testing (PLT) along with Product Verification Testing (PVT).

- Assigning QCCs should become a semi-automated process. See Section H, below, for details.

Recommendation 2: Implement a more comprehensive Government Contract Quality Assurance (GCQA) program for critical items. This GCQA program is to conform to FAR Subpart 46.4, *Government Contract Quality Assurance*, and DFARS Subpart 246.4, *Government Contract Quality Assurance*.

- DLA Aviation should task the DCMA to perform in-plant surveillance to include production surveillance and quality assurance support for all CAIs, SPCs, and first article test items.
- DLA should develop a new “Memorandum of Understanding between DLA and DCMA” effective FY 2015. It should facilitate, for CAIs, SPCs, and first article test items, DCMA performing in-plant surveillance to include production surveillance and quality assurance support.
- DCMA should routinely be delegated the authority to have PLT and/or PVT performed when they are providing GCQA and they deem it to be necessary.

Recommendation 3: Significantly reduce the number of first article tests being performed. The first article test program should conform to FAR Subpart 9.3, *First Article Testing and Approval*, and DTM 13-007, *DLA First Article Requirements and Process Management*.

- Technical-Quality personnel should only approve the performance of first article testing that is authorized by FAR Section 9.303. In exceptional cases supervisors may waive that FAR Section 9.303 compliance.
- EBS should be modified to automatically remove the “Y” indicator from the first article test indicator fields in the NSNs material master 120 days after it was entered (see Section H).
- All requests to perform first article testing should be pre-screened using the AMC/AMSC matrix described in Sections D-8 and H. Requests for first article testing that do not meet the AMC/AMSC matrix criteria should be returned unless the request contains detailed justification.
- First article testing procedures, contained in DTM 13-007, should continue to be used to supplement and expand on FAR Subpart 9.3 guidance.
- DLA Aviation should take command actions to facilitate the effective implementation of DTM 13-007, *DLA First Article Requirements and Process Management*.

H. Management Tools

In this section five management tools will be detailed. The first three tools are intended to directly support the management of first article testing. These three tools are:

- AMC/AMSC First Article Test Screening Tool
- First Article Test Management Tool
- First Article Test Indicator Management.

The fourth and fifth tools are related to improving the utilization of an existing quality management tool: Quality Control Codes (QCCs).

1. AMC/AMSC First Article Test Screening Tool

The purpose of this tool is to function as an initial screen of first article test requests to determine if they satisfy specific FAR Subpart 9.3 first article test requirements. Specifically, first article testing may be appropriate when:

- Technical specifications are so novel or exacting that it is questionable whether the product would meet the requirements without testing and approval, or
- There have been subsequent changes to the technical specification.

This tool would primarily be used by technical-quality specialists in conjunction with the FAR subpart 9.3 and DTM 13-007 to determine if a request to perform a first article test is valid.

The tool is displayed below in Table 4-11, which is an AMC/AMSC matrix with explanatory notes. The green and pink colored cells form the basis of a go-no go type of test for first article test requests. There will be situations where first article test requests are assigned to pink cells, i.e., no go, based on their NSNs' AMC/AMSCs, for which the first article test requirements, due to special circumstances, are valid. These cases, based on FAR Subpart 9.303, occur when:

- The contractor has not previously furnished the product to the Government
- The contractor has previously furnished the product to the Government, but:
 - Production has been discontinued for an extended period of time, or
 - The product acquired under a previous contract developed a problem during its life.

Initializing the tool requires the technical-quality specialist to access EBS, using the item's NSN contained in the first article test request, and determine the item's AMC/AMSC. This information permits the technical-quality specialists to identify the appropriate cell in the AMC/AMSC matrix and the cell's color. If the color of the cell is

pink, then the technical-quality specialists need to examine supporting information to see if one of the FAR Subpart 9.3 exceptions supports the need for a first article test.

Table 4-11. AMC/AMSC First Article Test Matrix

AMSC	AMC=1	AMC=2	AMC=3	AMC=4	AMC=5	AMSC Explanation	Rationale
A						Governments rights are questionable	Procure Manufacturers Part Number
B						Source Control	Drawing contains Approved sources
C						ESA Approval	Dependent upon contractors quality history
D						Data not available	Procure Manufacturers Part Number
G						Full and Open	Dependent upon contractors quality history
H						Government does not have sufficient data	Procure Manufacturers Part Number
K						Requires class 1A casting	Dependent upon contractors quality history
L						Annual buy value below screening threshold	Procure Manufacturers Part Number
M						Master or coordinated tooling required	Dependent upon contractors quality history
N						Requires special test or inspection facilities	Dependent upon contractors quality history
P						Data rights cannot be procured	Procure Manufacturers Part Number
Q						Government does not have adequate data	Procure Manufacturers Part Number
R						Data not economical to purchase	Procure Manufacturers Part Number
T						QPL	QPL contains approved sources
U						Cost to breakout exceeds projected savings	Procure Manufacturers Part Number
V						Designated high-reliability part	Dependent upon contractors quality history
Y						Design unstable	Dependant Upon Available Data
Z						This item is commercial off the shelf	Commercial item government has no control

AMC Acquisition Method Code

- 1 Suitable for competitive acquisition
- 2 Suitable for competitive acquisition first time
- 3 Acquire directly from actual manufacturer
- 4 Acquire, for first time, directly from actual manufacturer
- 5 Acquire only from prime manufacturer

2. First Article Test Management Tool

The purpose of this tool is to provide DLA Aviation with a means to monitor the status of first article testing. This monitoring tool will provide management with the current status of first article tests, and the annual and weekly number of first article tests that most likely do not conform to FAR Subpart 9.3 guidance. This is accomplished by providing three graphic summations of the number of first article tests performed and being performed annually and weekly. The three graphic representations all employ the same graphic format, i.e., Table 4-11 but address different time aspects of first article testing. These three first article test status reports are:

- A fiscal year summation, by AMC/AMSC, of the number of first article tests carried over from the last fiscal year and the number of current year tests, both ongoing and completed.
- A weekly summation, by AMC/AMSC, of the number of first article tests carried over from 2 weeks ago and the number of new tests originated last week.
- A weekly summation, by AMC/AMSC, of the number of new first article tests originated during the last week.

The body of each of the three reports will be identical to Table 4-11. The headers of the reports will include a report date entry, i.e., start and end reporting dates. The headers will also include a title unique to each report: First Article Test Fiscal Year Report, First Article Test Weekly Summation Report, or First Article Test Weekly New Start Report.

These three matrices can be created manually, but it is desirable to develop a software program to accomplish the 3 weekly produced reports. The software program could be a standalone program like DLA Aviation's weekly backorder report or become a standard EBS report. The latter option will require a software change request to be developed, approved, and implemented.

The data descriptors and the data sources required to complete these three matrices are listed in Table 4-12. The primary data source is DLA Aviation's new test tracker database which contains all of the required data elements. The critical components in developing the matrices are near-real-time awareness of when new contracts that require a first article test to be performed have been awarded and the associated contract award dates. A weekly check of the Test Tracker Database provides both the near-real-time awareness of all new contracts and their contract award dates. In addition it provides the contracts' Procurement Item Identification Numbers (PIINs) which are the key to identifying those contracts that require first article testing when utilizing the ZT Test process. A QM 17 report, produced by the ZT Test process, relates the PIINs to first article test completion dates.

Table 4-12. AMC/AMSC Matrices Data Sources

Data Descriptors	EBS Data Sources
NIIN (Material)	[First Article] Test Tracker Database
PIIN/SPIN	
Contract Award Date (FAR Start Date for contracts that require FATs)	
AMC/AMSC	
FAR Completion Date	Test Tracker Database or alternatively QM 17 Report
QM 17 Report Variable	Activity Text Variable: DSCR
QM 17 Report Variable	Activity Code Variable: DPVR

3. First Article Indicator Management Tool

Each NSN's Material Master contains a first article test indicator field. In order for a solicitation to contain a first article test requirement, the responsible technical-quality specialists must enter a 'Y' into the first article test indicator field and provide the associated lists of FAT characteristics. EBS retains this first article test data indefinitely

or until the technical-quality specialists delete it. Based on IDA-conducted interviews, these data are rarely deleted by the responsible technical-quality specialists.

The purpose of the management tool is to employ automation to ensure that DLA Aviation's management of first article tests conforms to the FAR Subpart 9.3 policy—using FATs to test contractors instead of their products. This can be accomplished by automatically deleting the data in the first article test indicator field 120 days after it is entered. To accomplish this, it is desirable to submit an EBS software change to automate the deletions.

4. Semi Automating the Selection of Quality Control Codes (QCCs)

The assignment of QCCs identifies the contract quality requirements contractors must satisfy, and it also defines the scope of the Government's associated contract quality assurance programs. In essence, the assigning of QCCs is an essential and critical quality and quality assurance function. As such, the assignment of QCCs requires management control and supervision. The purpose of this management tool is to improve the utilization of QCCs by more closely coupling QCCs to the criticality of the products being procured.

This management tool is intended to establish minimum QCC requirements for consumable items, based on selected criteria: Weapon System Designator Codes (WSDCs), Weapon System Essentiality Codes (WSECs), and FAR Subpart 9.3, *First Article Testing*. Tables 4-13 and 4-14 list the recommended management assignment criteria for the first two positions of a quality control code. The assigned technical-quality specialist is responsible for determining the QCC value for the third and final QCC position. The ability to change, on a case-by-case basis, either the first or second position assigned QCC values is to be restricted to appropriate DLA Aviation management level.

There will be numerous occasions when DLA Aviation management will be required to override the minimum QCC requirements for positions one and two. This will be driven by the practical difficulty in identifying critical items, i.e., items that require the assignment of a higher level contract quality codes. Unfortunately, CAIs cannot reliably be used to identify critical items due to extensive over-coding: approximately 50 percent of DLA-managed consumable items are coded as CAIs.

The implementation of this tool is straightforward. It will require DLA Aviation to make a mass data change in EBS for practically all DLA Aviation-managed consumable items. There are key fields associated with these NSNs that can be used to assign the desired QCC to each item. These fields are: commercial off-the-shelf (COTS); special

procedures codes for ALRE, CSI, ICBM, C&B, and IRPOD¹⁶; weapon system designator code (WSDC), and weapon system essentiality code (WSEC).

Table 4-13. QCC First Position: Minimum Requirements

QCC Value	QCC Literal	Remarks
B	Commercial	All commercial off-the-shelf items, i.e., COTS
C	Contractor Responsibility	Non Weapon System Designator Code WSDC items
D	Standard Inspection	WSDC items and Weapon System Essentiality Code (WSEG) of 3, 6, or 7
E	Higher Level Contract Quality	WSDC and WSEC of 1 or 5
F	Higher Level Contract Quality ISO 9001:2000	WSDC and SPC item
J	Standard Inspection + GFAT	WSDC items and WSEG of 3, 6, or 7. FAR Part 9.303 (a) or (b) applicable.
K	Higher Level Contract Quality + GFAT	WSDC and WSEC of 1 or 5. FAR Part 9.303 (a) or (b) applicable.
L	Higher Level Contract Quality ISO 9001:2000 + GFAT	WSDC and SPC item. FAR Part 9.303 (a) or (b) applicable.

¹⁶ ALRE = Aircraft Launch and Recovery Equipment; CSI = Critical Safety Items; ICBM = Intercontinental Ballistic Missile items; C&B = Chemical and Biological items; and IRPOD = Individual Repair Part Ordering Data.

Table 4-14. QCC Second Position: Minimum Requirements

QCC 1st Position Value	QCC 2nd Position Value	QCC 2nd Position Literal	Remarks
B	A	No quality subsystem requirements	
C	A	No quality subsystem requirements	
D	D	Certificate of Conformance (CoC)	
E	H	Measurement and Test Equipment and CoC	Standard Inspection (1 st Pos. QCC=D) performed concurrent
F	B	Product Verification Testing (PVT)	
J	D	Certificate of Conformance (CoC)	
K	H	Measurement and Test Equipment and CoC	Standard Inspection (1 st Pos. QCC=D) performed concurrent
L	B	Product Verification Testing (PVT)	

5. Expanding the Scope of Quality Control Codes

Production Lot Testing (PLT) ensures critical manufacturing processes are functioning properly during production and up to acceptance. PLT can also be used to verify that critical/major characteristics comply with contractual requirements, especially characteristics that cannot be verified after final assembly. PLT is a useful GCQA tool. Correspondingly, Product Verification Testing (PVT) is a pre-acceptance test that is conducted after completion of production and prior to Government acceptance, another useful GCQA tool. Effective production verification testing requires the development of PVT test plans in order to verify technical conformance of critical/major characteristics.

The purpose of this management tool is to improve the utility of the QCCs, especially the utility of the QCC's second position, quality subsystem identifiers. These subsystem identifiers are primarily used to prescribe and support GCQA efforts. Technical-quality specialists employ QCCs to ensure solicitations contain the appropriate FAR and/or Defense Logistics Acquisition Directive (DLAD) contract quality clauses. The second position of a QCC provides the option to require that a PVT be performed. That option, when selected, is exercised by inserting a DLAD contract clause 52.246-9004 into the solicitations. However, the QCCs do not provide the option for technical-quality specialists to select PLT. (PLT is a very useful GCQA tool. It is especially useful when the technical-quality specialist requires contractors satisfy higher level contract quality requirements.)

The second position of QCCs should be expanded to include production lot testing and production lot testing in conjunction with PVT. To accomplish this, three actions are required:

- Expand the number of QCC second position codes to include PLT and PLT/PVT

- Add a PLT contract clause to the DLAD
- Modify the appropriate appendices in the *DLA Technical-Quality Policy and Procedures Desk Book*.

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5. Technical Data Package Reviews

IDA was asked to analyze the technical data package (TDP) process used by DLA Aviation. DLA Aviation's objective is to make the TDP process more efficient and responsive to the needs of DLA customers, the military services, and the combatant commanders. Specifically, IDA's statement of work as supplemented by the sponsor's verbal direction called for an assessment of the TDP process and recommendations including:

- TDP process changes that will significantly reduce the time to perform TDP reviews
- Changes that will significantly reduce the number of TDP reviews and thereby reduce the associated negative impact on procurement lead times
- Changes that will improve the cost effectiveness and efficiency of the TDP process.

A. Problem

DLA Aviation has experienced an increase in the number of TDP reviews over the past 5 years. The Product Data Management Division (PDMD) has experienced backlogs of TDPs awaiting review. TDP reviews associated with procurements add to procurement lead times, which adversely impacts DLA Aviation's responsiveness to customers and DLA's ability to procure and deliver items in a timely manner. Many TDP reviews performed by DLA Aviation's PDMD and product specialists (PSs) require coordination with the Services' ESAs as part of the review process. The number of TDPs that require military service ESA coordination and review has increased over the past 5 years. The policy requirements for including ESAs in the TDP review process are included in DLAI 3200.1, *Joint Engineering Support Instruction (JESI)* and the performance-based agreements (PBAs) associated with *JESI*.¹

An analysis of ESA TDP reviews by HQ DLA found that about 60 percent of ESA TDP reviews result in no changes to the existing DLA TDP. HQ DLA's analysis also revealed that when changes to technical data did occur, as part of the ESA's response to

¹ The Joint Engineering Support Instruction (JESI) is a joint instruction and designated by DLA as DLAI 3200.1. This instruction, signed in 2010, is currently being revised. DLA and the Services have bilateral PBAs that supplement *JESI*. The PBAs include specific periodic TDP review intervals that can and do differ by Service.

TDP engineering support requests, the changes were often minor or of a nature that would not impact suppliers' ability to produce the item. In short, the changes would have no impact on DLA's procurement of the item.²

B. Data and Analysis

IDA used quantitative data from various parts of DLA's Enterprise Business System (EBS) to support the analyses included in this section of the report. In addition to quantitative data, TDP information was obtained by reviewing relevant DoD, DLA, and DLA Aviation policy documents. In analyzing the current practices used by DLA Aviation to process and manage TDPs, IDA conducted interviews with a number of DLA Aviation personnel including those in the Product Data Management Division, Business Process Division, Aviation Engineering, and various profit centers to which product specialists are assigned. The interviews were useful in understanding how the current TDP process works at DLA Aviation.

1. Data

Data used to perform analyses were obtained from various technical and procurement reports in DLA's EBS and DLA Aviation's financial system. Data sources used will be identified for each of the charts included in this section.

2. Analyses

Analyses were performed to determine the scope and magnitude of the problem described to IDA by DLA Aviation and summarized in paragraph A, "Problem," above. The specific detailed analyses included in this section were chosen as they provide insight into DLA Aviation's use and quantity of TDP reviews, the effect of TDP reviews on procurement lead times, and the costs associated with TDP reviews. In order for the analyses to be meaningful it is important to understand what TDPs are and how they are used.

3. Description of TDPs

A technical data package is defined in MIL-STD-31000A as "A technical description of an item adequate for supporting an acquisition, production, engineering, and logistics support (e.g., engineering data for provisioning, training, and technical manuals)."³ The technical description defines the required design configuration or

² Dowd, Kenneth MG, Director DLA Military Logistics Operations, Email February 04, 2013. Subject: Tech Data Package – validation change.

³ MIL-STD-31000A, 26 February 2013, Department of Defense Standard Practice, Technical Data Packages.

performance requirements, and the procedures required to ensure the adequacy of an item's performance. It consists of applicable technical data such as models, drawings, associated lists, specifications, standards, performance requirements, quality assurance procedures (QAPs), software documentation, and packaging details.

4. Uses of Technical Data

Technical data are used in many ways including writing and maintaining technical manuals used by maintenance activities; to assist in conducting engineering investigations into item failures; to assess root causes of quality deficiencies; to maintain configuration control, etc. DLA's primary use of technical data is to support procurement actions by providing suppliers a technical description of the product (product description) that DLA is interested in procuring. This product description includes technical data necessary to manufacture the items, e.g. drawings. In this paper, the term *technical data package* (TDP) consists of all the technical data used as the product description for DLA's procurement of an item.

Most DLA Aviation procurements do not use a technical data package as the product description. Product descriptions can also be a military specification or standard, a commercial item description, a manufacturer's part number, a reference to a COTS item. While these alternate product description types can include technical data, they are not TDPs that require Service ESA engineering support reviews. That is because military specifications and standards, and commercial items descriptions (CIDs), have a formal review and approval process that does not include ESA involvement.⁴ DLA has access to the Acquisition Streamlining and Standardization Information System (ASSIST) which serves as the official repository of Military Specifications and Standards. DLA uses ASSIST to ensure they have the current version of the specification or standard as the product description. Similarly, technical data associated with manufacturers' part numbered items are maintained by the manufacturers.

An estimate of the proportional shares of the various types of technical product descriptions used by DLA to procure weapon system consumable items is shown in Figure 5-1. IDA developed this distribution of major product description types in a previous research effort.⁵

⁴ See DOD 4120.24-M and MIL-STD-961 for a description of how military specifications and standards are maintained and approved.

⁵ IDA analyzed product description types for all weapon system NSNs procured by DLA in June 2000. The results of that analysis were used to build Figure 5-1. That figure was briefed as part of a study on the reform of military specifications and the effect on the Defense Supply Center Richmond (DSCR) standardization program.

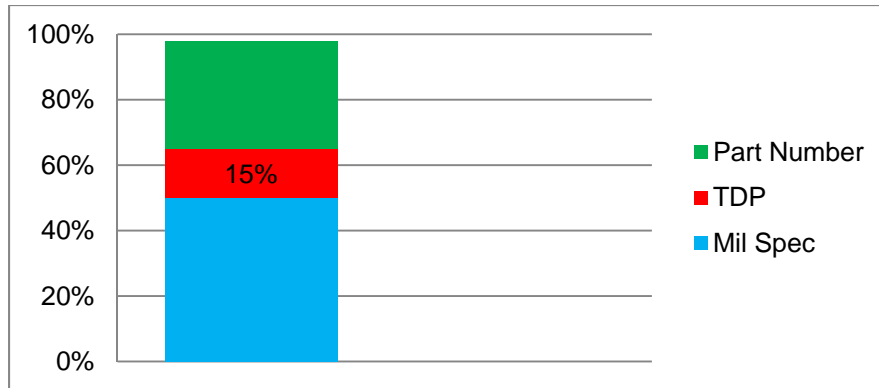


Figure 5-1. Common Product Description Types

Most DLA weapon system consumable items⁶ procured use military specifications or standards as the product description, followed by part numbers. Approximately 15 percent are procured using TDPs as the primary product description.⁷

5. Responsibility for Maintaining Current Technical Data Used in TDPs

For weapon system items, the military services are responsible for maintaining current technical data in support of DLA, the integrated material manager (IMM).⁸ This is imperative as the military services use the technical data to maintain their technical manuals as well as the configuration control/management for their weapon systems. As configuration managers, the military services may make changes to the technical specifications, drawings or other technical data that affect the product description (TDP) that DLA uses to solicit and contract for items.

DLA procures the vast majority of weapon system consumable items for the military services and therefore it is essential that the Services provide DLA with current technical data so that the DLA-procured items will satisfy the item's technical requirements. For example, any change to an item's form, fit, function, interface or technical requirements that would impact a contractor's ability to produce an item that meets the government's needs, must be included in the TDP. Therefore, the military service ESAs must notify DLA of changes to TDPs to ensure DLA has current technical

⁶ A consumable item of supply is identified as: "An item of supply (except explosive ordinance, major end items, and repairables) that is normally expended or used up beyond recovery in the use for which it is designed or intended." Reference DoD 4140.1-R, *DoD Supply Chain Management Regulation*.

⁷ IDA Paper P-4202, *Analysis of the Joint Engineering Support System and Its contribution to the DoD Supply Chain*, May 2007.

⁸ DoD Manual 4140.26-M *DoD Integrated Materiel Management for Consumable Item: Logistics Reassignment*, Volume 4, September 24, 2010, Encl. 3 paragraph 2.b.(8) page 9. Also, the current Joint Engineering Support Instruction (JESI) states on page 11 in paragraph F.3.a. "Engineering Support Activities will: a. Retain responsibility for engineering support, configuration management, and maintaining current technical data on items managed by DLA which are used on Service end items."

data to use for procurement actions. DLA maintains files of complete sets of TDP data; therefore, it is necessary to inform DLA of changes to the TDP only if the changes affect DLA's ability to use that TDP as a product description in procurement actions.

The current procedures for updating TDPs are included in *JESI* (DLAI 3200.1) and the associated performance-based agreements between the military services and headquarters DLA. These procedures call for DLA to send TDP review requests to the cognizant Service ESAs on a calendar-based review cycle. See Section 7 and Tables 5-1 and 5-2 for the specific times between required ESA TDP reviews.

A calendar-based TDP review cycle does not ensure that the latest technical data (TDP) will be available for DLA procurement actions. That is, changes to the TDP that affect its use as a product description must be incorporated within DLA's TDP prior to the next procurement, regardless of how long it has been since the last TDP engineering support review. Otherwise, DLA may procure items that do not satisfy the technical requirements of the item.

Table 5-1. TDP Review Cycle – December 2013

Current Technical Data Review Cycle	
Army	
CSI	Expires 12 Months
CAI or Weapon System Coded Items	Expires 60 Months
All other NSNs	No Expiration
Air Force	
CSI	Expires 12 Months
CAI or Weapon System Coded Items	Expires 60 Months
All other NSNs	No Expiration
Navy	
CSI	36 Months
CAI	60 Months
All other NSNs (including Weapon System Coded)	No Expiration
Marines	
All NSNs	No Expiration

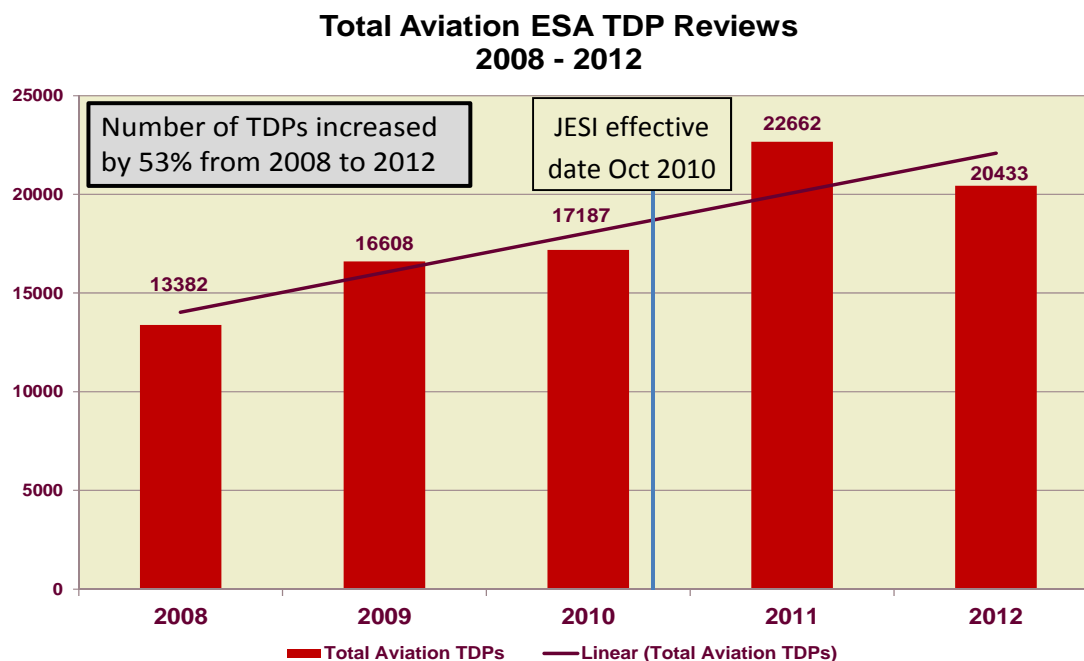
Table 5-2. TDP Review Cycle - January 2013

Prior Technical Data Review Cycle	
Army	
CSI & CAI, & Weapon System Coded Items	Expires 12 Months
All other NSNs	No Expiration
Air Force	
CSI, CAI, or Weapon System Coded Items	Expires 14 Months
All other NSNs	No Expiration
Navy	
CSI	38 Months
CAI	62 Months
All other NSNs (including Weapon System Coded)	No Expiration
Marines	
All NSNs	No Expiration

6. Number of TDP ESA Reviews

In order to analyze the scope and number of TDP ESA reviews at DLA Aviation, IDA reviewed 5.5 years of TDP data. Figure 5-2 shows the number of ESA TDP reviews for 2008–2012. The number of TDPs shown includes all DLA Form 339 unique case numbers, Requests for Engineering Support in which TDPs were the reason for the engineering support, and all Manual Bidset Request Trackers (MBRTs).⁹ The chart shows that the number of TDPs increased 53 percent from 2008 to 2012 (13,382 to 20,433).

⁹ Manual Bidset Request Trackers are used in lieu of DLA Form 339. The MBRT is only used by DLA Aviation to request TDP engineering support from the Army. All MBRT requests to the Army are for TDP reviews.



Source – DLA Aviation 339 Listing and DLA Aviation MBRT reports 2008 through 2012

Figure 5-2. Number of DLA Aviation TDPs 2008- 2012

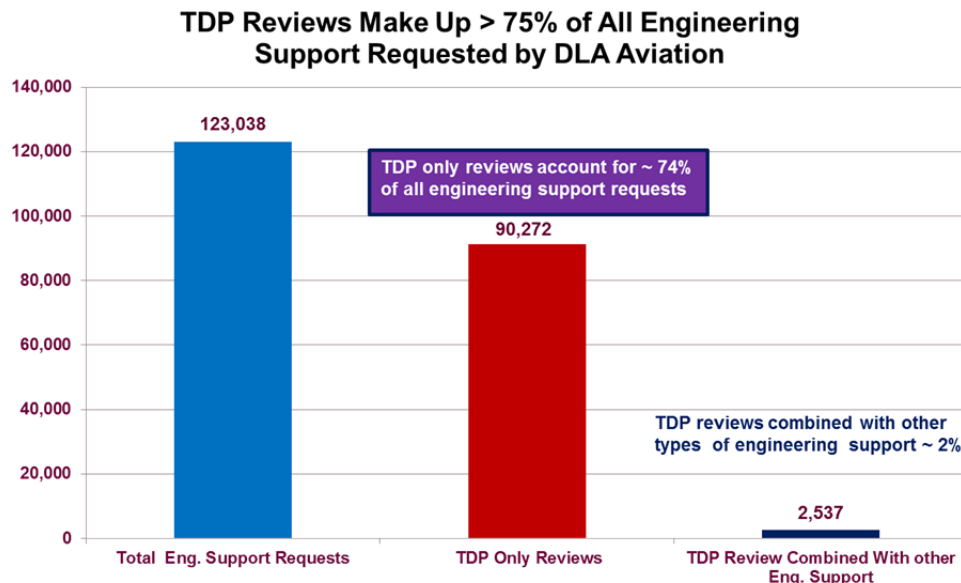
While Figure 5-2 shows the total number of ESA TDP reviews for 2008-2012, it does not address why there are so many reviews and why they have grown in number. The answer to these questions came through interviews at DLA Aviation. All of the product specialists, product data specialists, engineering personnel, and managers that were interviewed agreed that the reason for the large number and increase in ESA TDP reviews was a result of following the policy included in the *JESI* and the associated PBAs that took effect in October 2010. *JESI* states in Enclosure 3 that “An item is identified for Technical Data Package development or revalidation in accordance with documented military service requirements (e.g. tech data expiration date).” These requirements are found in the PBAs associated with the *JESI*. The calendar-based review cycles used in 2013 are summarized in Tables 5-1 and 5-2. DLA Aviation personnel were following the HQ DLA policy, i.e., *JESI*, regarding TDPs and those policies resulted in a costly approach that added to contract ALTs and decreased DLA responsiveness to customer needs.

The problems of increasing TDP numbers, TDP costs, and increased procurement lead times were all related to the ESA TDP review process. Therefore, ESA TDP reviews became the focus of the TDP analysis.

7. TDPs Are Responsible for a Large Percentage of Engineering Support Requests

The increase in the number of TDPs over time raised a question. What percent of total requests for ESA engineering support are made up of TDPs? Looking at the number of TDPs in the context of all DLA Aviation requests for engineering support provides perspective on the number and growth of ESA TDP reviews. Figure 5-3 below shows the results of comparing the increased number of ESA TDP reviews to all DLA Aviation requests for engineering support.

Analyzing the data used to create Figure 5-3 revealed that ~ 76 percent of all DLA Aviation engineering support requests included a TDP review and ~ 74 percent of engineering support requests were for TDP engineering support only. This had significant implications for the analysis, as TDP reviews become a predominant driver for increased procurement lead times and engineering support costs.



Source of Data - DLA Aviation 339 Listing and MBRT Reports 2008 – 2012

Figure 5-3. ESA TDP Reviews Compared to All Engineering Support (2008 – 2012)

JESI and associated DLA/military service PBAs require periodic ESA TDP reviews for weapon system coded items. This frequency varies depending on the criticality of the items. The TDP review cycles also vary by military service, as shown above in Tables 5-1 and 5-2. Table 5-1 reflects the current TDP review cycles that HQ DLA has agreed to with the military services or has determined to use in order to move toward standardized TDP review cycles. However, as can be seen in Table 5-1, the TDP review cycles still

vary by Service, although not as much as was the case with the TDP review cycles that were in effect in early 2013, as shown in Table 5-2.¹⁰

Two major differences exist between Table 5-1, the current review cycle for TDPs, and Table 5-2, which shows the review cycles in early 2013. First, an email from the DLA's Director of Military Logistics Operations to the Army's AMRDEC at Huntsville unilaterally changed the TDP review cycle for Army CAI and weapon system items from 12 months to 60 months.¹¹ The email explained that this was to bring the Army in line with the other Services and that most TDP reviews did not result in significant changes that impact the use of TDPs as the product description, and hence had no impact on procurement. In a similar change the Air Force agreed to extend the TDP review cycle to 60 months for CAI and non-critical weapon system items. Note that the Navy's review cycle for CSIs is three times longer than the Air Force and Army review cycles for CSIs.

It should also be noted that the criteria for all engineering support reviews, including TDP reviews, are based on a combination of the item's criticality (CSI, CAI, or non-critical), whether the item is a weapon system item as indicated by a weapon system designator code (WSDC), and the calendar time since the last review. The criteria for a TDP review do not require the military service ESAs to notify DLA when a change is made to a TDP. As a result, the ESAs do not push the details of changes in TDPs to DLA when changes occur. This approach results in the possibility that items procured by DLA may be made using outdated TDPs. This can occur if an item has had a change to its TDP but has not yet reached its periodic review time, which is based on the expiration date in Table 5.1. In this case, the item will not trigger an automated review in the EBS release strategy workflow (RSW). Addition consequences of using a calendar-based review cycle are: an increase in the number of unnecessary ESA TDP reviews, longer DLA contract ALTs, increased DLA costs, and a reduction in DLA's ability to respond quickly to its customers. All of these adverse consequences result from the calendar-based review cycle, which links the trigger for TDP reviews to the DLA procurement process. These problems could be removed by linking the updating of TDPs to changes in the TDPs. Changes to a TDP are the only reason for DLA to have a need to update/review an existing TDP.

DLA Aviation product data specialists (PDSs), product specialists (PS), and others involved with TDPs comply with the HQ DLA agreed-to policy/procedures included in DLAI 3200.1, *Joint Engineering Support Instruction for Items Supplied by DLA (JESI)*. Therefore, in order to reduce the adverse impact on procurement lead times, added costs,

¹⁰ Table 5.2 includes the agreed-to TDP ESA review intervals as found in the Service's Performance Based Agreements associated with the *JESI*.

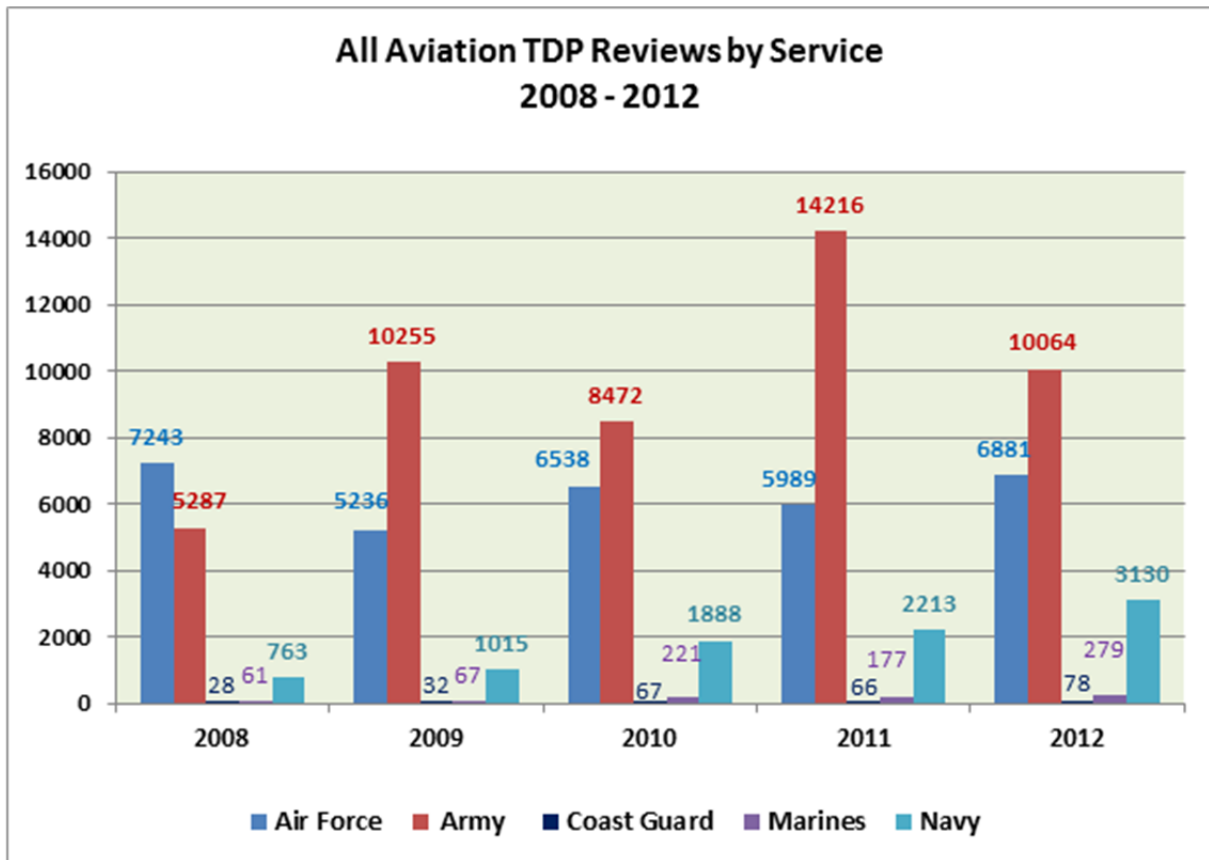
¹¹ Email from Dowd, Kenneth S MG US Army DLA MIL LOGISTICS OPERATIONS, Sent: Monday, February 04, 2013 2:10 PM, Subject: Tech Data Package - validation change.

and DLA responsiveness, the *JESI* and associated PBAs will need to be changed or eliminated. Recommendation 1 at the end of this chapter provides a way to delink TDP ESA reviews from DLA procurement actions. This will help satisfy the sponsor's desires to significantly reduce the costs of TDP reviews and the increased ALT times associated with the current TDP review process.

8. The Number of TDP Requests Varies by Military Service

Not only do the TDP review cycle times differ between military services, but also the number of TDP reviews varies. Figure 5-4 shows the number of TDP reviews by Service for 2008-2012. The number of TDP reviews shown includes all DLA Form 339s, Request for Engineering Support, that included TDP, block 15d, and all MBRTs.¹² It is clear from Figure 5-4 that the Army requires the most TDP reviews, followed by the Air Force. For the period 2008- 2012, the Army conducted over 53 percent of DLA Aviation TDP reviews, the Air Force 35 percent, and the Navy 10 percent. The difference in the percentages is a result of the TDP review cycles agreed to by HQ DLA and the Services as shown in Tables 5-1 and 5-2 above and the number of items procured by DLA for which the Service ESA has responsibility for engineering support.

¹² Manual Bidset Request Trackers (MBRTs) are used to request TDP engineering support from the Army. The MBRT process is similar to the DLA Form 339 process, but works via email. DLA Aviation contacts the Army technical data repository directly to request a TDP review. The process takes approximately 30 days to complete and costs on average ~\$600 to \$700. The MBRT process is used only for Army TDP reviews.



Source of Data - DLA Aviation 339 Listing and MBRT Reports 2008 – 2012

Figure 5-4. Number of ESA TDP Reviews by Service (2008 – 2012)

9. Impact of ESA TDP Reviews on Procurement Lead Times

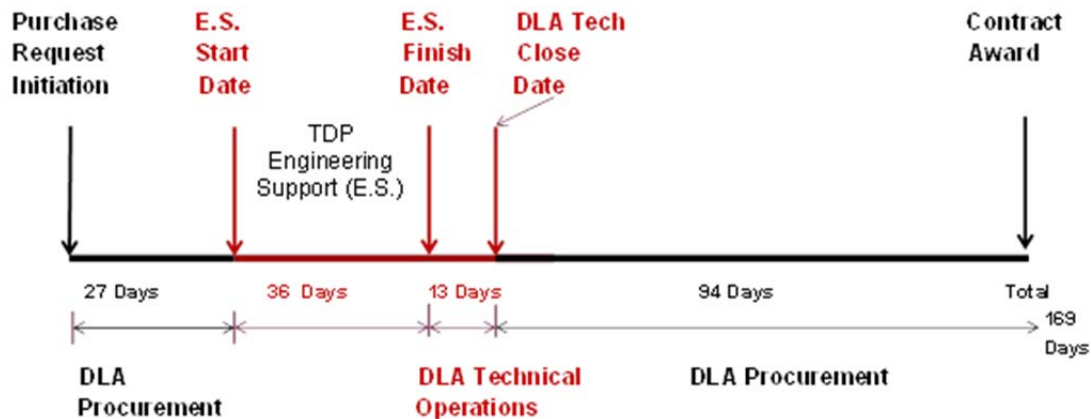
Figure 5-5 graphically portrays the average number of days added to procurement lead time for PRs that require an ESA TDP review. As indicated, the average ALT, i.e., PR initiation to contract award, takes 169 days for procurements that require an ESA TDP review. Forty nine of these days are for the ESA and DLA to review the TDP.

The breakdown of the 169 days is as follows:

- Purchase request initiation to engineering support start date: 27 days
- Engineering support start date (DLA Form 339 start date) to engineering support finish date (date DLA Form 339 received back from ESA): 36 days
- Engineering support finish date to DLA technical close date (tech releases PR back into product workflow): 13 days¹³

¹³ This 13-day period includes the time for the technical data specialist or product specialist at DLA Aviation to update the technical data within EBS and the data management system (DMS) and release the PR back into product workflow after receiving the ESA response to the engineering support request.

- DLA technical close date to contract award date: 94 days.



ESA TDP reviews add on average 49 days to ALT

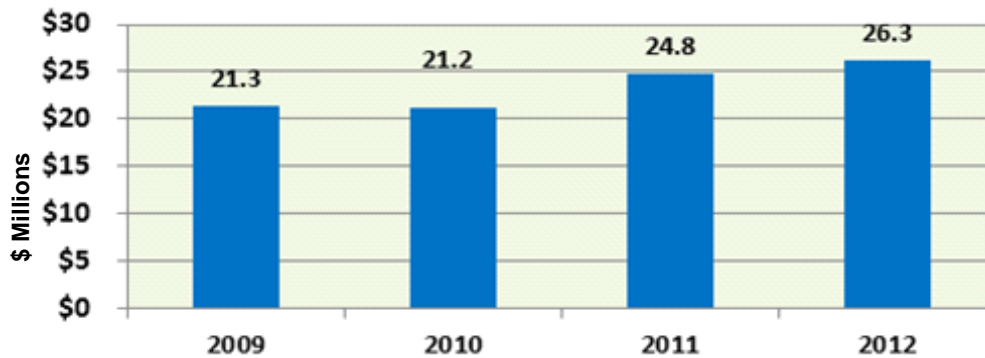
Source: DLA Aviation 339 Listing Report and DLA Aviation procurement data 2008 – Jun 2013

Figure 5-5. Impact of TDP Reviews on Procurement Lead Time

The times shown in Figure 5-5 are based on 5.5 years of procurement data and show that on average a TDP review adds 49 days to the procurement ALT. In 2012 there were 20,433 ESA TDP reviews (see Figure 5-2). The impact per year of TDP reviews on DLA Aviation ALTs was significant. For example, **in aggregate, TDP reviews added ~1,001,217 days (2,740 years) to DLA Aviation’s total procurement lead times (49 days x 20,433 procurements) in 2012.**

10. Impact of ESA TDP Reviews on Costs

The costs associated with TDPs are reported by the military services’ ESAs on a monthly basis to DLA Aviation. Some ESA reports are provided in an Excel spreadsheet format but others are not. It is possible to sample the average costs for ESA reviews of TDPs, but the format of reported ESA costs does not support detailed computations of average cost to process TDPs. However, as TDPs make up ~75 percent of all requests for engineering support, it is possible to use engineering support cost growth as a proxy for TDP cost growth. Figure 5-6 shows that engineering support costs increased 24 percent from 2009 to 2012. Assuming that the average cost to process a TDP is similar to the average cost to process other requests for engineering support, the approximate cost of TDP reviews in 2012 was ~\$19.7 million. Figure 5-2 showed an increase of 19 percent in the number of TDPs from 2009 to 2012 and is another indicator of growth of TDP reviews and TDP costs.



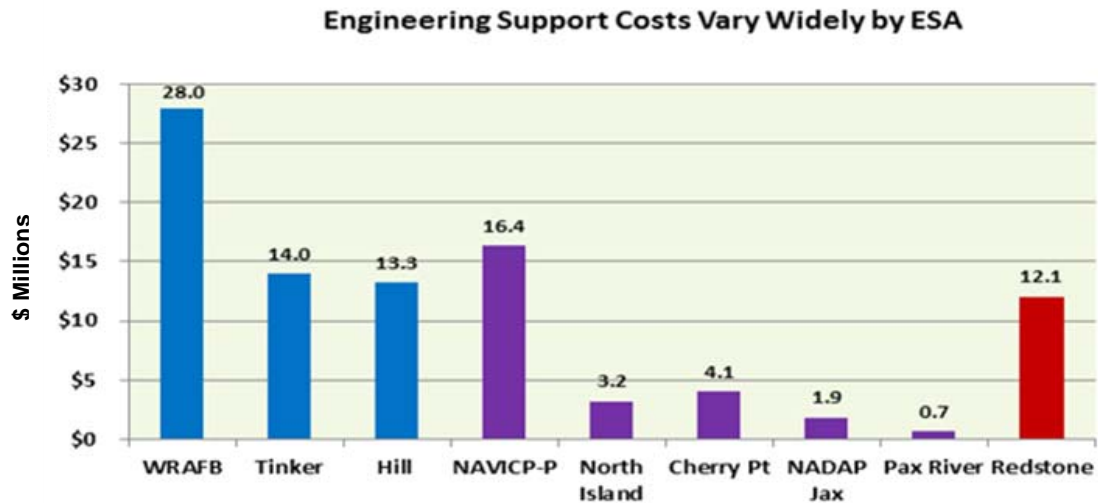
Source of ESA cost data is the DLA Aviation Comptroller's office

Figure 5-6. DLA Aviation Total Annual Engineering Support Costs (FY 2009 – FY 2012)

11. Engineering Support Costs Vary by Service and ESA

Section 10 above shows the growth in engineering support costs. In an effort to determine what was driving these cost increases, IDA analyzed individual ESA engineering support costs to see if cost growth was limited to a few ESAs or was consistent for all ESAs.

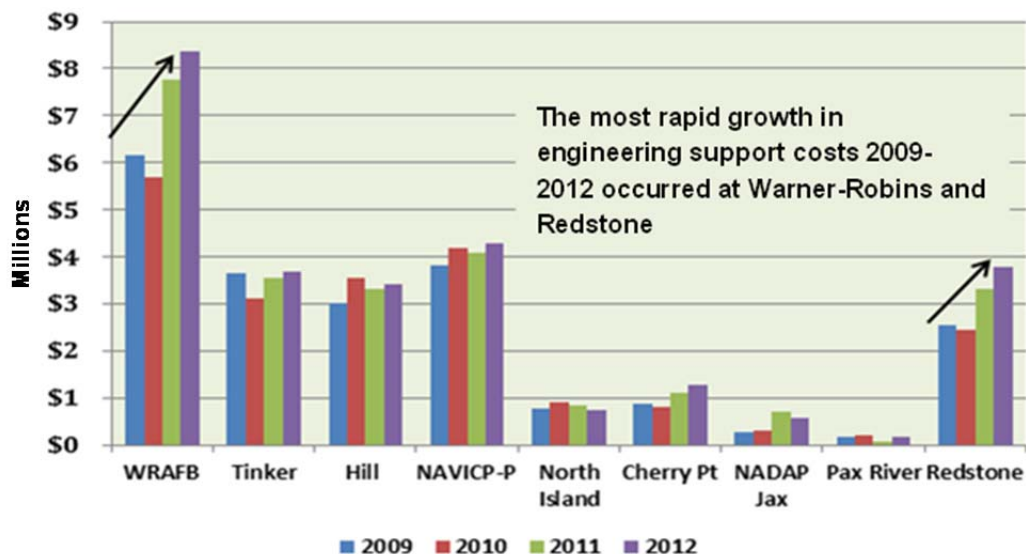
Figure 5-7 shows that the amount of engineering support provided to DLA Aviation, and therefore the cost varies significantly by military service and ESA. Air Force ESAs are shown in blue, Navy ESAs in purple, and the Army in red. The total Air Force ESA engineering support costs paid by DLA Aviation amounts to ~ \$55.3 million or ~59 percent of the total DLA Aviation engineering support costs of \$93.5 million for 2009-2012. Navy engineering support costs totaled \$26.2 million or 28 percent of total costs incurred for engineering support for FY 2009-FY 2012. The Army ESA engineering support costs incurred by DLA Aviation totaled \$12.1 million or 13 percent of DLA Aviation's engineering support cost for the 4-year period.



Source of ESA cost data is the DLA Aviation Comptroller office.

Figure 5-7. Engineering Support Costs by ESA (FY2009 – FY2012)

Engineering support costs paid by DLA Aviation to the Service ESAs are broken out by year in Figure 5-8. This graphic provides visibility into individual ESA costs over time and highlights those ESAs whose costs are growing most quickly. As shown by the arrows in Figure 5-8, Warner Robins AFB and the Army's Redstone Arsenal have shown the most rapid growth in DLA Aviation costs for engineering support for the period FY 2009 through FY 2012. The other ESAs shown had smaller changes in annual engineering support costs. Figures 5-7 and 5-8 include the costs to perform the TDP reviews, previously shown in Figure 5-4 above, *and all other engineering support costs*.



Source of ESA cost data is the DLA Aviation Comptroller office

Figure 5-8. DLA Aviation Engineering Support Costs by Year (FY 2009 – FY 2012)

12. Using Acquisition Strategy (AMC/AMSC) Codes to Assure Appropriate Use of TDPs as Product Descriptions

Another analysis performed was to determine the relationship between items' Acquisition Method Code (AMC)/Acquisition Method Suffix Code (AMSC) and TDP items for which there were requests for engineering support as documented in DLA Form 339s. Characterizing the AMC/AMSC for items that have historically required TDP reviews is useful as there is a relationship between the AMC of an item and the use of a TDP as a product description. The AMC shows whether an item's acquisition strategy is suitable for competitive acquisition and whether the item should be acquired directly from the prime contractor or the actual manufacturer. For TDPs to be used as the product description in a contract, one would expect an acquisition strategy suitable for competition, i.e., have an AMC of 1 or 2. An AMC of 3, 4, or 5 would indicate the item should be acquired directly from the prime contractor or the actual manufacturer. In these cases, the contractor would already have the technical data or be the design control authority for the item's technical data as the designer of the item or owner of the technical data.

The AMSC code provides engineering, manufacturing, and technical information that when coupled with the AMC code provides an acquisition strategy for procurement. Most AMSC codes provide information on ownership or rights to data, the quality or completeness of data, and other factors that limit or otherwise affect the way the Government can procure an item.

Table 5-3 shows the possible AMC/AMSC combinations for items procured by DLA and their suitability for using the TDP as a product description.

Table 5-3. AMC/AMSC Codes Suitable for the Use of TDPs as a Product Description

Acquisition Method Code						AMSC Totals	Acquisition Method Suffix Code Explanation
AMSC	AMC=1	AMC=2	AMC=3	AMC=4	AMC=5		
A							Governments rights to data questionable
B							Source Control
C							Part requires engineering source approval
D							Data needed to produce this item not available
G							Govt. has unlimited rights to technical data
H							Government does not have sufficient data
K							Requires class 1A casting
L							Annual buy value below screening threshold
M							Master or coordinated tooling required
N							Requires special test or inspection facilities
P							Data rights cannot be procured
Q							Government does not have adequate data
R							Data not economical to purchase
T							Acquisition controlled by Qual Products List (QPL)
U							Cost to breakout exceeds projected savings
V							Designated high-reliability part
Y							Design unstable
Z							This item is commercial off the shelf
AMC Totals							

AMC	Acquisition Method Code
1	Suitable for competitive acquisition
2	Suitable for competitive acquisition first time
3	Acquire directly from the actual manufacturer
4	Acquire, for the first time, directly from the actual manufacture
5	Acquire only from the prime contractor

Not all AMC/AMSC combinations support the need for having a TDP as the product description in procurement actions. In those cases where the quality, completeness, or ownership/rights to use data are limited or in which the AMC indicates competition is not a suitable acquisition strategy, then a TDP is not suitable to serve as the product description. For example, a TDP for an item with an AMSC of “D” (data needed to produce this item is not available) would likely not provide suppliers the drawings and other technical requirements necessary to manufacture an item that meets all the technical requirements. Similarly, when the AMC directs use of the prime contractor or actual manufacturer (AMC 3, 4, or 5) a TDP is not generally needed as the product description will likely be a manufacturer’s part number for which the prime contractor or actual manufacturer will have the technical data. They may even be the design control authority for the item. By far the most common appropriate use of a TDP as a product description is when the AMC calls for competitive procurement and a complete set of technical data with full Government rights for use of the data exists, i.e., AMC 1 or 2 and AMSC of B, G, or T.

Table 5-3 shows in green the AMC/AMSC combinations most suitable for using a TDP as the product description. AMC/AMSC combinations in which a TDP may be appropriate are shown in yellow. The remaining AMC/AMSC combinations would not be good candidates for the use of a TDP as the product description and are shown in red.

The historical data for all TDP engineering support requests made using DLA Form 339 from January 2008 through June 2013 are shown in Table 5-4. The results are quite surprising as a large percentage of TDP reviews were done in association with

procurements for which the use of a TDP as the product description was inappropriate based on the AMC/AMSC combination (numbers in red boxes). Each TDP review increases procurement lead time by an average of 49 days. As shown in the box at the bottom right of Table 5-4, 37 percent of TDP engineering support reviews were unnecessary as indicated by the acquisition strategy or technical data characteristics described by the AMSC. The table shows that of the 30,185 TDP engineering support requests, 11,282 (37 percent) were not suitable for the use of the TDP as a product description.

ESA TDP reviews performed for items not suitable for use as a product description, as indicated in the red blocks in Table 5-4, add to ALT and DLA costs. Using Table 5-4 as a template to screen out unnecessary ESA TDP reviews could reduce annual cumulative ALT days by 362,600 for DLA Aviation, and the cumulative annual cost savings would amount to > \$7 million.¹⁴

Table 5-4. AMC/AMSC Codes for TDP Engineering Support Reviews (2008 – June 2013)

Acquisition Method Code							Acquisition Method Suffix Code Explanation
AMSC	AMC=1	AMC=2	AMC=3	AMC=4	AMC=5	AMSC Totals	
A	7	1	34	1	1	44	Governments rights to data questionable
B	729	23	346	17	15	1130	Source Control
C	4314	168	2070	9	10	6571	Part requires engineering source approval
D	2	1	1025	30	4	1062	Data needed to produce this item not available
G	11757	1564				13321	Govt. has unlimited rights to technical data
H	1079	52	1750	58	69	3008	Government does not have sufficient data
K	164	9	10			183	Requires class 1A casting
L	117	8	446	1	7	579	Annual buy value below screening threshold
M	242	50	38			330	Master or coordinated tooling required
N	8	2	6		2	18	Requires special test or inspection facilities
P	157	8	746	14	3	928	Data rights cannot be procured
Q	780	28	974	12	13	1807	Government does not have adequate data
R	175	10	619	5	2	811	Data not economical to purchase
T	157	6	2			165	Acquisition controlled by Qual Products List (QPL)
U	9		46	2	2	59	Cost to breakout exceeds projected savings
V	1		24			25	Designated high-reliability part
Y	4	2	16		6	28	Design unstable
Z	35	10	59	9	3	116	This item is commercial off the shelf
AMC Totals	19737	1942	8211	158	137	30185	

AMC	Acquisition Method Code	Color Code	Number in Matrix	% of Total
1	Suitable for competitive acquisition	Not Appropriate for TDP	11,283	37%
2	Suitable for competitive acquisition first time	Appropriate for TDP	18,718	62%
3	Acquire directly from the actual manufacturer	May be Appropriate for TDP	184	1%
4	Acquire, for the first time, directly from the actual manufacturer			
5	Acquire only from the prime contractor			
		Totals	30,185	100%

¹⁴ Cumulative ALT and cost savings were calculated as follows: **ALT savings** – the number of ESA TDP reviews for 2012 = 20,433 x 37% = 7,560 x 49 days (average ALT per ESA TDP review) = 370,450 cumulative ALT days saved/year. A 37% reduction can be achieved by eliminating inappropriate TDP reviews using Table 5-4 as a template to screen out unnecessary TDP reviews. **Cost savings** – Reducing ESA TDP reviews by 7,560 per year results in saving >\$7M (7,560 x \$940 per = \$7,106,400). Estimated cost per TDP calculated by dividing \$19.2M (estimated cost for all TDPs in 2012) by number of TDPs in 2012 (7560) = \$940.

C. Assessment

IDA was tasked to analyze the TDP process and make recommendations that would significantly decrease the number, time, and costs of TDP reviews. IDA also recognized the importance of assuring that when TDPs are used by DLA as the product description in procurement actions, that the TDP be current. The analysis section of this chapter provided data to show that the number and costs of TDPs have increased over time and that the impacts on procurement lead times are significant. The analyses also provide alternatives that can lead to significant reductions in the number, costs, and negative impacts on procurement lead times. Specific recommendations are included in the Conclusions and Recommendations sections below. An assessment of the analyses is included below that will provide the rationale for the conclusions and recommendations.

Current policy and procedures require Service ESA TDP reviews based solely on the criticality of the item, calendar time since the last review, and whether the item has a weapon system designator code. This is not a sound approach and results in many unnecessary TDP reviews. The current approach ignores the fundamental reason why a TDP review should be performed. The only trigger for updating a TDP should be a **change** to the TDP. Regardless of when the change occurs, DLA will need the updated TDP for the next procurement. Therefore, it is necessary for the Service ESAs to provide TDP changes to DLA as they occur. For TDPs that have not changed, regardless of the time since the last review and regardless of the item's criticality or weapon system status, the TDP is still useable as the product description.

The Services "pushing" TDP changes to DLA would significantly reduce the number of TDP engineering support reviews. The vast majority of items procured by DLA for the Services have stable designs. This is one of the screening criteria used before transferring items to DLA.¹⁵ Therefore, changes to technical data that affect form, fit, function, interface, or the ability of a contractor to produce an item that meets requirements do not occur frequently for a given item. However, when they do occur, DLA Aviation needs to be notified immediately.

It will take some time to fully implement the change from DLA requesting TDP reviews to the Services notifying DLA when changes have occurred. In the interim, DLA should only request ESA TDP reviews for procurement actions in which a TDP is used as the product description **and** there is reason to believe the TDP has changed. DLA Aviation has access to Service technical data repositories and can thereby determine if top level drawings or other key technical data have changed. The Services' technical

¹⁵ The criteria used to determine if an item is suitable for transfer from the Services to DLA is included in DoD 4140.26-M Volume 2, *DoD Integrated Materiel Management (IMM) for Consumable Items: Item Management Coding (IMC) Criteria*, September 24, 2010, Incorporating Change 2, June 30, 2014 (page 34).

data repositories will in most cases be able to allow DLA to determine if a change to the TDP has occurred and support DLA's decision on the need for a TDP review. Current instructions included in DLAI 3200.1 (*JESI*) do not permit DLA to rely solely on the technical data repository to determine the need for a TDP review. Changing policy to require TDP reviews only when technical data have changed would result in a reduction in the number of TDP reviews and procurement lead times.

For items being procured using a specification, standard, or part number as the product description, DLA should not have to request engineering support for a TDP review. The AMC/AMSC matrix above (Table 5-3) can serve as a template on when it is appropriate to use a TDP as a product description in DLA procurement actions. This will serve as a backup until the Services are routinely pushing changes to technical data to DLA as they occur.

The military service engineering support activities rightfully assert that they are responsible for configuration management and maintaining current technical data for their weapon systems items. DoD 4140.1-R dated May 23, 2003, made this clear in paragraph C3.4.1.4.3, which states "The losing manager shall retain responsibility for engineering support, configuration management, and current technical data in support of the gaining manager for transferred consumable items." Inherent in this responsibility is that the Service ESAs will initiate TDP reviews as needed to meet their Service's needs. TDPs for weapon system items are used for multiple purposes, including documenting changes to configuration and other design changes; for use in maintenance manuals, technical orders, and engineering analyses; and for other applications for the military service. DLA is but one user of current technical data. Therefore, the Services have many reasons to keep the technical data current beyond DLA's need to use the current TDP for procurement actions.

The Service ESA can decide when and how often it reviews the TDP. If a change is made by a Service to the TDP for an item procured by DLA, and that change will affect DLA's use of the TDP as a product description in contracts, then the Service ESA making the change should expeditiously notify DLA what changes have been made. There is no need for DLA to send a request for engineering support to the ESA for TDP reviews unless a change has been made to the TDP and DLA has questions about the change.

D. Conclusions

The assessment of the TDP data, policy, and procedures led to the conclusion that it is feasible to reduce the number, cost, and time of TDP reviews while assuring TDPs are current. The current DLA policies that establish policy and procedures for TDPs result in many unnecessary ESA TDP reviews. The ESA reviews add to unnecessary administrative lead times and increase DLA costs. The policy and procedures included in

the *Joint Engineering Support Instruction (JESI)* and the performance-based agreements between DLA and the Services need to be changed in a way that ties the need for TDP reviews to known changes in the TDP. TDP changes are known to the Services and the Service ESAs need to push TDP changes to DLA as they occur. This practice will sever the link between ESA TDP reviews and DLA procurement actions and replace it with a system where DLA updates TDPs as changes are made by the military services. The result will be many fewer ESA TDP reviews associated with DLA procurements, leading to shorter DLA procurement lead times and increased DLA responsiveness to its customers.

It will take a period of time for the Services to implement procedures to push their technical data packages changes to DLA as those TDP changes occur. This change from the current practice is very important as it will significantly reduce procurement delays that occur as a result of TDP reviews. DLA need not wait until this transition is complete to realize savings in time and money. Implementing the use of the TDP matrix (see Table 5-4) will serve as an immediate way to screen out acquisition strategies (AMC/AMSC combinations) that are not suitable for the use of a TDP as a product description. This will reduce the number of needless ESA TDP reviews by a minimum of 37 percent based on historical engineering support request (DLA Form 339) data.

The key to reducing the number of ESA TDP reviews is to change the criteria for TDP reviews from calendar-based to event-based. The event that should trigger the need for a TDP update is a change to the TDP made by the responsible military service. If TDP changes affect form, fit, function, interface or change technical requirements that affect a contractor's ability to produce the item, then the Service should notify DLA of that change as it occurs. If an item's TDP has not changed then DLA procurement actions need not be impacted by requesting an ESA TDP review based on calendar time since the last review.

Once a TDP is established, the trigger to update the TDP in use by DLA is a **change** made by the Services to the technical data. The Services can review TDPs as frequently as necessary based on their needs and desires. The reviews should be independent of DLA procurement actions. If the Services make a change to DLA items for which DLA is the primary inventory control activity and procuring agency, then it should be incumbent on the Services to notify DLA Aviation of **changes to the TDP that will affect procurement**. Changes of this nature are not driven by calendar time but rather actual changes to the TDP that can occur at any time based on changes to configuration, design changes, modifications, and upgrades to weapon system components, subsystems, or configuration items.

E. Recommendations

Recommendation 1. Have the military service ESAs “push” technical data changes to DLA as changes occur.

- This includes TDP changes that affect form, fit, function, or interface, or other changes that impact the ability of a manufacturer to produce an item that meets technical specifications and requirements.
- This recommendation should be codified by including implementation language in a DoD logistics management policy document such as DoDI 4140.01, *DoD Supply Chain Materiel Management Policy*.

Recommendation 2. DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled.

- The TDP provisions of the performance-based agreements associated with DLAI 3200.1 should be cancelled. Specifically, the guidance that calls for DLA to request ESA TDP reviews based on calendar time, criticality, and weapon system designator code.
- Base the need for an ESA TDP review on the key **event** that warrants a DLA request for a TDP review. That is, a **change** to the TDP that affects form, fit, function, or interface and thereby would affect the use of the TDP as a product description within a DLA contract.

Recommendation 3. Recommendation 1 will take a period of time to implement. In the interim, request ESA TDP reviews only when it is clear the procurement acquisition strategy, as indicated by the AMC/AMSC Codes, is suitable for using a TDP as the product description.

- Use the AMC/AMSC matrix (Table 5-3) as a guide to screen and reduce unnecessary ESA TDP reviews.

Recommendation 4. Do not require ESA TDP reviews for procurement when:

- Using a manufacturer’s part number as the product description
- Using military specifications or standards as the product description.

Recommendation 5. The Services should maintain transparency of technical data for DLA.

- The Services maintain technical data repositories for the storage of TDPs. DLA should have access to all military service technical repositories.
- DLA’s access to technical data repositories should be all that is required to assure DLA that they are using the latest technical data, thus eliminating the need for unnecessary ESA TDP reviews.

Recommendation 6. TDP policy and procedures that address critical safety items should not be changed based on this paper. CSIs require a higher level of management by all parties to assure that the items produced meet all requirements.

6. Backorders

A. The Backorder Task

The two primary analytical thrusts of the backorder section of the statement of work were to: (1) holistically characterize DLA Aviation backorders and (2) determine the root causes of those backorders. The holistic characterization was to focus on technical-quality operations, i.e., the impact of technical blocks, first article tests, technical data package reviews, organic manufacturing, etc. The root-cause determination was to address and identify technical-quality operations that are negatively impacting backorders. Based on this analytical research, IDA was tasked to develop recommendations that can be used to modify or refocus technical-quality operations in a manner that will reduce DLA Aviation backorders.

The Director, Aviation Engineering and the study's sponsor both supplemented and clarified the statement of work guidance by stating IDA was to place particular attention on *significantly* reducing both the time and cost required to perform technical-quality operations.

The root-cause analysis of backorders is addressed in Chapter 3, above, where that analysis was expanded to encompass both first article tests and technical data package reviews.

B. Backorder Dynamics

Backorders are addressed in the *Defense Logistics Agency Metrics Dictionary, Fiscal Year 2013* under the heading of unfilled orders (UFOs). UFOs are defined as all actionable unfilled orders currently on hand. More specifically, a UFO is a consumable item that has been assigned one of the following (requisition transaction) Status Codes:

- BB - Item backordered against a due-in stock.
- BD - Requisition delayed due to need to verify requirements relative to authorized application, item identification, or technical data.
- BV - Item procured and on contract for direct shipment to consignee.
- BZ - Requisition is being processed for direct delivery procurement.

Figure 6-1 portrays the UFO or backorder posture of DLA Aviation as a function of time. The figure requires some explanation in order to be useful. First, the UFO totals include *all* unfilled requisitions; that includes both stockage and non-stockage items.

Many government and commercial organizations, unlike DLA, restrict the classification of backorders to only stockage items.¹ Compared to the more widely used definition of backorders, this tends to inflate DLA Aviation’s backorder statistics. Second, DLA starts counting backorders as soon as the UFO or requisition is assigned a Status Code, i.e., almost immediately upon receipt of a requisition. Therefore, numerous requisitions, within the first 30 days of receipt, rapidly transition through the backorder reporting process. For example, upon receipt of a requisition it is classified as backordered and shortly thereafter it becomes a completed transaction – items issued from stockage.

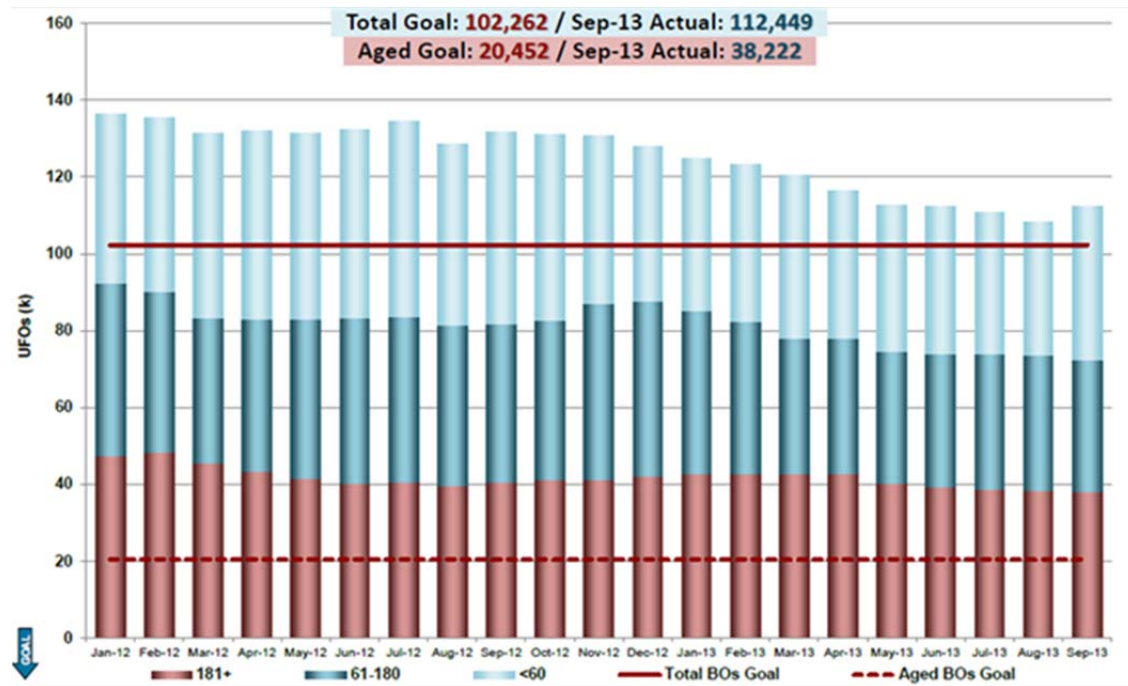


Figure 6-1. DLA Aviation Unfilled Orders Posture as a Function of Time

DLA Aviation does not have a supply chain responsible for all DLA Aviation backorders. This stems from the different roles and functions assigned to the **DLA Demand Chain** and the **DLA Supply Chain**. Figure 6-2 provides a graphic representation of the two types of logistics chains. The **Demand Chain** is represented by the top row of boxes in the figure. The **DLA Aviation Demand Chain** is customer facing and is responsible for order management and demand planning for their aviation customers. The **DLA Aviation Demand Chain** also places orders for consumable items with the appropriate **DLA Supply Chain** as depicted by the bottom row of boxes. The **Supply Chain** is supplier facing. Its primary role is to purchase and manage the flow of

¹ Prior to EBS the term “backorder” was used by DLA to indicate that a stockage item was out of stock. EBS gave DLA the capability to address both stocked and non-stocked items. To avoid confusion the term UFO was selected to describe both stocked and non-stocked items that are not available for issue. This study used the term backorder vice UFO.

inbound materials, intended for resale to **Demand Chain** customers. DLA Aviation is the item manager² for consumable items ordered and received by the **DLA Aviation Supply Chain**. UFOs/requisitions, when unfilled, comprise actionable DLA Aviation backorders.

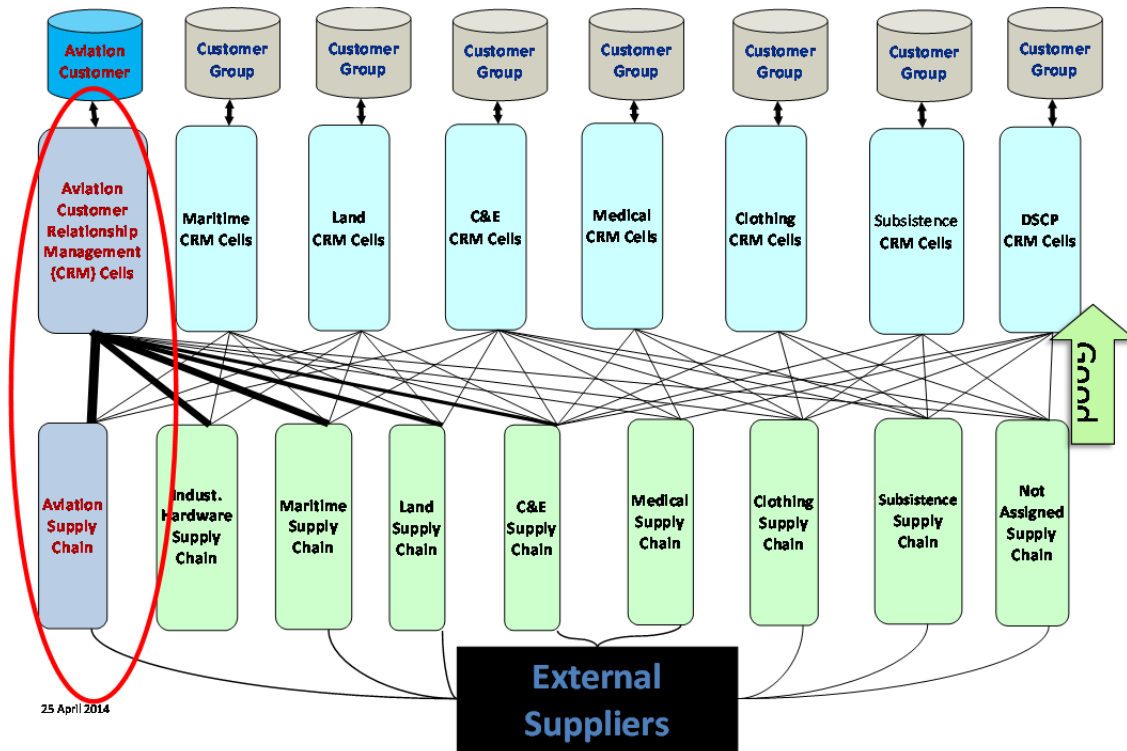


Figure 6-2. Demand and Supply Chain Interfaces

This analysis will focus on DLA Aviation long term backorders. The objective definition of long term backorders is those backorders that are at least 180 days old. However, in this analysis that definition was approximated by considering those on-going procurement actions that have assigned Procurement Instrument Identification Numbers³ (PIINs). This approximation simplified IDA's data processing, identified active procurements, and provided a reasonable approximation of long term backorders.

Two approaches are addressed in this study as ways to *significantly* reduce both the costs and procurement times associated with backorders, and both the costs and

² DLA's current practice is to manage customers [needs] and suppliers. This study supports that approach to management. However, IDA, in this study, uses the term "item manager," which DLA generally does not use. It is used in this study since it captures the DoDM 4140.01 meaning, "A single Integrated Materiel Manager shall manage each item in the DoD supply system".

³ DFARS Subpart 204.70 defines the uniform Procurement Instrument Identification (PII) numbering system. A unique PIIN is assigned to all solicitation/contract instruments. A PIIN consists of 13 alpha/numeric characters.

administrative lead times required to process procurement instruments. The two approaches are:

- Reduce the total number of manual procurements required to satisfy DLA Aviation Supply Chain requirements
- Identify policy and procedures that will permit manual procurements to be processed in a more expedient manner.

Table 6-1 identifies several *critical common characteristics* that, if effectively utilized, will permit the above-listed two approaches to make a significant impact on long term backorders. The analysis in this section will focus on reducing the number of manual procurements required to support the DLA Aviation Supply Chain. The reductions in technical-quality processing times for manual procurements are primarily addressed in Chapters 3, 4, and 5. The analyses and assessment of organic manufacturing will be addressed later in Section F.

A significant and logical segmentation of long term backorders involves the categorization of backordered National Stock Numbers (NSNs) as either stockage NSNs or non-stockage NSNs. The primary objective of stockage NSNs is to prevent backorders of any significant duration as the item should normally be available for issue from stock. Since stockage performance and stockage issues are beyond the scope of this analysis they will not be addressed here. Therefore, this analysis will focus on non-stockage long term backorders. *The objective of the following analysis is not to prevent long term backorders but to reduce the impact of those backorders on DLA Aviation's customers by significantly reducing their administrative and production lead times while simultaneously reducing the associated administrative costs of those procurement actions.*

Table 6-1. Analytic Approach to Managing Long Term Backorders

Limit the Impact of Backorders	Critical Common Characteristics	Required Actions	Analysis of Critical Common Characteristics
Reduce the Overall Technical – Quality Workload			
Manual Procurements: Reduce The Number Of Manual Procurements	Federal Stock Group and Classes (FSG and FSC)	Identify and Manage FSGs and FSCs that Contain 50% Of Long Term Backorders	See Sections D, H, and I
	Procurement Instrument Identification No. (PIIN)	Reduce the Number Of PIINs By Grouping NSNs	See Sections D, H, and I
	Critical Application Item (CAI)	Restructure the CAI Program to Make It An Effective Management Tool	See Chapter 4, Sections D-10 through D-12
	Weapon System	Identify and Manage Weapon System Types Having a Large Number of Backorders	See Sections D, H, and I
	Stockage Calculations	Modify Stockage Calculations	Out of Scope; Not Addressed
Expedite the Processing of Manual Procurements			
Manual Procurements: Reduce The Technical – Quality Processing Time	Technical Data Package (TDP) Review	Dramatically Reduce the Number of TDP Reviews	See Chapter 5
	First Article Test (FAT)	Replace Current FAT Practices with “Build In Quality” Process.	See Chapter 4, Sections F and G
	Critical Application Item (CAI)	Redefine CAI to Address Manufacturing Criticality	See Section E, Chapter 3, Sect. E and F

Central to this analytic approach is identifying ways to reduce the total number of manual procurements required to satisfy DLA Aviation Supply Chain requirements. To address this challenge a hypothesis is proposed. The hypothesis and subsequent analysis of the hypothesis will be addressed below in Section D. The testing of the hypothesis will involve *using historical data to find a small set of holistic characteristics – critical system-wide characteristics – common to a large number of backorders that will permit subsequent demands for those items to be collectively managed in a way that will reduce the impact of future backorders.*

Holistic characteristics or variables were used to perform two analytical functions in this study. First they were used to help refine the hypothesis, i.e., define a small set of characteristics common to a large number of backorders. Secondly, they were used to characterize backorder NSNs. These two categories of holistic variables are listed in Table 6-2.

Table 6-2. Holistic Characteristics or Variables

Holistic Variable	Common to a Large No. of Backorders	Characteristics of Backorders
National Stock Number (NSN)	X	
Federal Stock Group (FSG)	X	
Federal Stock Class (FSC)	X	
Acquisition Advice Code (AAC)	X	X
[Requisition Transaction]Status Code	X	X
Procurement Instrument Identification Number (PIIN)	X	X
First Article Test Indicator (FAT)		X
Government First Article Test (GFAT)		X
Contractor First Article Test (CFAT)		X
Critical Application Item (CAI)		X
Critical Safety Item (CSI)		X
Weapon System Designator Code (WSDC)		X

C. Data

Critical to performing the analysis is the identification and collection of both current and historical Enterprise Business System (EBS) data. The single most useful set of data was the weekly backorder report produced by DLA Aviation's Research, Review and Analysis Division (BAE). These weekly reports contain 78 EBS data fields and covered a 42-month period. Selected other data were obtained from both BAE and the DLA Operations Research and Resource Analysis (DORRA) activity including:

- All DLA Aviation assigned NSNs
- Weapon System Designator Code (WSDC) nomenclature
- Acquisition Advice Codes (AAC) for all DLA Aviation assigned NSNs
- Critical Safety Item (CSI) identifiers for all DLA assigned NSNs
- Acquisition Method Code/Acquisition Method Suffix Code (AMC/AMSC) for all DLA Aviation assigned NSNs
- First Article Test (FAT) Indicators for all DLA Aviation assigned NSNs.

In addition, select data from two previous studies that the Institute for Defense Analyses performed for Headquarters, DLA and DLA Aviation, respectively, were used. Use of those data will be footnoted in this report as appropriate. Those two studies are:

- IDA Paper P-4202, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply Chain*, May 2007

- IDA Paper D-4217, *Improving the Management of Critical Application Items*, February 2011.

D. Analysis: Reducing the Number of Manual Procurements

1. A Hypothesis and the Analysis of the Hypothesis

The following hypothesis is dependent on three critical common characteristics in Table 6-1: (1) Federal Stock Groups (FSGs) and Federal Stock Classes (FSCs), and (2) Procurement Instrument Identification Numbers (PIINs):

The number of long term backorders associated with non-stockage consumable items can be dramatically lowered by reducing the number of manually processed contracts by grouping, for procurement, NSNs assigned to *critical* FSCs.

The critical FSCs are a set of FSCs that collectively contains in excess of 50 percent of the current and past long term backorders for non-stockage consumable NSNs.

It is envisioned that the testing of the hypothesis will demonstrate that:

- There is a small critical set of FSCs that possess a sufficient number of long term and high turn-over backorders to justify grouping these NSNs for procurement.
- The same small critical set of FSCs remains unchanged over time, i.e., unchanged over a 3-year period.

It is also envisioned that by grouping a large number of procurements actions by FSC the following will result:

- The ALT for a grouped set of NSNs will be significantly shorter than the collective ALTs if those NSNs were not grouped together for procurement.
- Grouping of NSNs assigned to a single FSC for procurement is compatible with the industrial base supporting that FSC, i.e., contractors and suppliers capable of supplying the grouped items will be found.

The analysis of this hypothesis begins with the entire set of consumable items for which DLA Aviation is the item manager, i.e., supply chain manager. This list of NSNs will systematically be assessed and reassessed using select holistic variables associated with those NSNs.

Table 6-3 describes the 10 levels of analysis involved in this process. The table also shows the resulting NSN count by level, given the application of selected holistic constraints. Key changes in going from one level to the next level are highlighted in green.

Table 6-3. Testing the Long Term Backorder Hypothesis

Level	Description	NSN Count
	NSN Distribution	
1	All DLA Aviation NSNs	1,111,093
2	All valid DLA Aviation NSNs (NSNs possessing 13 numeric pos.)	1,110,362
	Backorder Distribution on June 24, 2013	
3	All valid DLA Aviation stockage and non-stockage, unique, and non-unique NSNs on backorder	271,174
4	All valid aviation supply chain stockage and non-stockage, unique and non-unique NSNs on backorder	127,174
5	All valid aviation supply chain stockage and non-stockage and unique NSNs on backorder	33,409
6	All valid aviation supply chain stockage and non-stockage and unique NSNs with PIINs on backorder	6,293
	Critical Federal Stock Groups (FSGs) & Backorders on June 24, 2013	
7	All valid aviation supply chain stockage and non-stockage and unique NSNs w/ PIINs on backorder and assigned to critical FSGs for 24/6/2013	4,593
	Critical Federal Stock Classes (FSCs) & Backorders on June 24, 2013	
8	All valid aviation supply chain stockage and non-stockage and unique NSNs w/ PIINs on backorder and assigned to critical FSCs for 24/6/2013	3,581
9	All valid aviation supply chain non-stockage and unique NSNs with PIINs on backorder and assigned to critical FSCs for 24/6/2013	2,741
	Critical Federal Stock Groups (FSGs) & Backorders; over 2.5 year interval	
10	All valid aviation supply chain non-stockage and unique NSNs with PIINs on backorder and assigned to (original) critical FSCs on June 2013, December 2012, June 2012, December 2011, and June 2011	8,094

The analysis starts at Level 1, which is unconstrained. It includes all NSNs for which DLA Aviation has demand chain responsibilities. The resulting NSN count is 1,111,093 NSNs.

Level 2 results when the constraint that each NSN must be described by 13 numeric characteristics is applied. This constraint reduces the NSN count by 731 NSNs to 1,110,362. The 731 NSNs that were deleted each contained one or more alpha characters or blank spaces. This typically indicates an invalid NSN.

Level 3 addresses the backorder posture on 24 June 2013. The count of backordered NSNs includes both **stockage and non-stockage** NSNs. This count also includes repetitive NSNs, i.e., multiple UFOs or requisitions for the same NSN. (Table 6-3 describes this set of NSNs as non-unique.) The Level 3 NSN count is 271,174 NSNs or 24 percent of the Level 2 count, despite the fact some of the Level 3 NSNs are repetitive; overall, this is a significant reduction in the NSN count.

The Level 4 selection criteria are identical to Level 3 criteria except that now only NSNs for which DLA Aviation has Supply Chain or item management responsibilities are counted. That is, backordered NSNs for which item management/supply chain responsibility resides with other DLA supply chains, e.g., the maritime supply chain, are not included in the Level 4 NSN count. This operation involved comparing the Level 3 set of NSNs with the Level 2 set of NSNs and selecting only those NSNs for which there were matches. The Level 4 NSN count is 127,174 NSNs, a 53-percent reduction from the Level 3 NSN count. *The 127,174 Level 4 NSNs are the set of backordered NSNs the DLA Aviation Supply Chain must satisfy either by issuing stock-on-hand or by procuring the items.*

The Level 5 NSN count is 33,409 backordered NSNs. This is the result of treating each set of repetitive (non-critical) NSNs⁴ as a single NSN. (When a set of repetitive NSNs is counted as a single NSN, Table 6-3 describes the resulting set of NSNs as a set of unique NSNs.) The 271,174 backordered NSNs, i.e., *the Level 3 NSN count*, has been reduced to 33,409 NSNs that the Aviation Supply Chain is responsible for satisfying by either issuing stock-on-hand or by procuring the items. This reduction in unique backordered NSNs is significant—an 88 percent reduction.

The Level 6 set of NSNs results from selecting only those Level 5 NSNs that have assigned Procurement Instrument Identification Numbers (PIINs). This ensures there are active contacts associated with them and they are likely to be associated with long term backorders.⁵ This application of the PIIN requirement reduced the Level 5 set of backordered NSNs to a set of long term backordered NSNs. *The Level 6 long term backordered NSN count is 6,293.*

Level 7 results from grouping the Level 6 set of long term backordered NSNs by FSG and then selecting only those FSGs that contain the preponderance of long term backorders, i.e., *critical* FSGs (see Table 6-4 and the supporting analysis). This technique yields the high density set of long term backordered NSNs. *The set of the seven selected FSGs contain 4,593 NSNs, which comprise 73 percent of the long term backordered NSNs.*

⁴ A repetitive NSN results when in a given period of time there are multiple requisitions for the same NSN.

⁵ An NSN is recorded as backordered once a requisition for the NSN is assigned an acquisition advice code. If a contract is not in place, no PIIN will be assigned. This study only examined PIINs for which contracts had been awarded. For this reason, IDA approximates *long term* backorders as those for which a PIIN has been assigned.

Table 6-4. Unique, Critical Backordered NSNs Associated With FSGs

		June 24, 2013 Data	
FSG	FSG Title	Ranking	Number of NSNs
15	Aircraft and Airframe Structural Components	1	1,091
16	Aircraft Components and Accessories	3	804
31	Bearings	5	487
53	Hardware and Abrasives	2	878
59	Electrical and Electronic Equipment Components	4	540
61	Electrical Wire, and Power and Distribution Equipment	7	345
68	Chemicals and Chemical Supplies	6	448
	Total		4,593
	Total Number of Unique, Non-Critical NSNs In Backorder Status (See Level 3 NSN count.)		6,293
	Percentage Of Backorder NSNs That Are Critical NSNs (4,593/6,293)		73%

Analysis: These data focused on unique, *critical* backordered NSNs associated with critical FSGs. The 6,293 unique NSNs listed in Table 6-4, above, account for 100 percent of the 127,174 UFO/requisitions on backorder at DLA Aviation on 24 June 2013. The 4,593 unique, *critical* NSNs account for approximately 73 percent of the unique long term back ordered NSNs. These NSNs are assigned to the seven FSGs listed in the table above and as such are described as the *critical* FSGs. This is significant since it indicates, at least for 24 June 2014, that the long term backorders are associated with a small set of FSGs.

Conclusion: Reducing the backorder problem to a small set of FSGs, and hopefully FSCs, means it may be possible to develop special techniques or processes to address a significant portion of the backorder problem.

The Level 8 analysis is restricted to the NSNs associated with the seven *critical* FSGs identified in the Level 7 analysis. In this analysis those seven *critical* FSGs are segmented into their component FSCs. From this set of FSCs only those FSCs that contain the preponderance of long term backorders, i.e., *critical* FSCs, are selected. (See Table 6-5 and the supporting analysis.) *The critical set of FSCs contains 3,581 NSNs, which comprise 57 percent of the long term backordered NSNs, a “manageable” number of NSNs.*

Table 6-5. Unique, Critical Backordered NSNs Associated with Critical FSCs

		June 24, 2013 Data	
FSC	FSC Title	Ranking	Number of NSNs
1560	Airframe Structural Components	1	1,091
1610	Aircraft Propellers and Components	11	105
1615	Helicopter Rotor Blades, Drive Mechanisms, and Components	9	157
1650	Aircraft Hydraulic, Vacuum, and De-icing System Components	11	97
1680	Miscellaneous Aircraft Accessories and Components	4	288
3110	Bearing, Antifriction, Un-mounted	5	227
3120	Bearings, Plain, Un-mounted	7	233
5340	Hardware, Common	11	105
5342	Hardware, Weapon Systems	10	117
5365	Bushings, Rings, Shims, and Spacers	2	392
5995	Cable, Cord, and Wire Assemblies: Communication Equipment	7	214
6150	Miscellaneous Electrical Power and Distribution Equipment	3	313
6850	Miscellaneous Chemical Specialties	6	242
	Total		3,581
	Number of Unique, Non-Critical Backordered NSNs: Level 6		6,293
	Percentage Of Critical Backorder NSNs (3,581/6,293)		57%

Analysis: The FSCs in Table 6-5 above are subset of the 7 FSGs listed in Table 6-4. This table shows that 13 FSCs out of a possible 167 FSCs form a critical subset of FSCs. This subset accounts for 57 percent of the unique, non-critical 6,293 backordered NSNs. This is significant since it indicates, at least for 24 June 2014, that a majority of the long term backorders are associated with a small set of FSCs that are a subset of the seven critical FSGs.

Conclusion: Reducing the backorder problem to a small set of FSCs and hopefully a small set of NSNs means it may be possible to develop special techniques or processes to address a significant portion of the backorder problem.

The Level 9 analysis separated the *critical* long term backorders into two categories: stockage and non-stockage NSNs. The Acquisition Advice Codes assigned to the Level 8 set of NSNs was used to identify the two categories. (See Table 6-6 and the supporting analysis.) *That analysis showed that 77 percent of the critical long term backordered NSNs are non-stockage items.* The 23 percentage of stockage NSNs on long term backorder seems to be a bit large for stockage items and it may be desirable for DLA Aviation to explore that issue.

Table 6-6. FSC: Acquisition Advice Code for Unique, Critical NSNs

Acquisition Advice Codes for Unique, Critical NSNs: June 24, 2013 Data (See Figure 6-3)													
FCS	A	D	F	H	I	J*	L	V	W	X	Y	Z	Total
1560		181		338		417						155	1,091
1610		0		102		3						0	105
1615		9		128		14						6	157
1650		14		27		44						12	97
1680		24		91		119						54	288
3110		13		27		148						39	227
3120		11		45		122						55	233
5340		6		45		35						19	105
5342		5		13		74						25	117
5365		16		84		245						47	392
5995		13		5		141						55	214
6150		9		26		208						70	313
6850		1		228		12						1	242
Total		302		1,159		1,582						538	3,581
Percent		8.4		32.4		44.2						15.0	100%

Legend AAC J*: 'J*' is the sum of all AACs except for 'D', 'H', and 'Z' for a given set of NSNs. As such 'J*' and 'H' comprise all non-stockage NSNs in that set. The symbol 'J*' was selected for convenience because the vast majority of non-stocked backordered NSNs, except for 'H', have an AAC of 'J'.

Analysis. These data focus on unique, *critical* NSNs. The two largest AAC categories in the above table are 'J*' and 'H'. These designations both correspond to NSNs that are non-stockage items. Given that approximately 77 percent of the backorders are associated with AAC 'J*' and 'H', it would have been desirable for the majority of those NSNs to be associated with AAC 'D', "integrated managed, stocked and issued" and thereby avoiding backorders. The third largest AAC category is 'Z', "numerical stockage." (The stockage issue, as characterized by all of the other AACs, may be a problem but it was not explored as it is beyond the scope of this study.)

Conclusion. The large number of backordered NSNs in AACs 'J*' and 'H' is too large. This may provide a focus for this subtask to identify ways to minimize the impact of backorders.

The Level 9 analysis demonstrated that approximately 60 percent of the long term DLA Aviation backorders are associated with only 2,741 non-stockage NSNs. In summary, this relatively small number of NSNs has partly validated the hypothesis that a relatively small set of NSNs, the source of a numerous backorders, could be grouped for procurement by FSC. *However, this analysis is insufficient since only backorder data*

from June 24, 2013, was examined. As a result this yields a unique solution but not the desired general solution.

The Level 10 analysis addresses this general solution issue. In this analysis the seven *critical* FSGs associated with June 24, 2013, form a reference set of FSGs. The same FSGs for December 2012, June 2012, December 2011, and June 2011 were compared to the reference set of FSGs. Concurrently, the associated number of unique, critical, and non-stockage backordered NSNs was identified. This analytical approach permits an examination of the long term backorder situation from June 2013 back through December 2010. Table 6-7, with two exceptions, shows that for all five periods they have the same *critical* set of FSGs. Those exceptions occur in the December 2011 and June 2011 data and are highlighted in red; they involve FSGs 31 and 68. In both cases they missed satisfying criteria by less than 100 backordered NSNs each. The significance of the analysis of the hypothesis is that approximately half of DLA Aviation long term non-stockage backorders are associated with a set of FSGs stable over a 2.5-year period.

The next issue to be examined is the extent to which the same set of NSNs was in a backorder status, i.e., stability, over the 2.5-year period. This was done by examining each NSN associated with one of the seven *critical* FSGs for each of the five periods if that NSN was ever in backorder in that period. The result was that 8,094 NSNs met those criteria. The original set of 2,741 backordered NSNs expanded by a factor of three over a 2.5-year period. The expansion is not optimal but manageable since it is still relatively small. **The significance of the analysis of the hypothesis is that approximately half of DLA Aviation long term non-stockage backorders are associated with a stable set of FSGs and a relatively small set of NSNs, both stable over a 2.5-year period.** The term “relatively small” reflects that fact the seven critical FSGs are comprised of a total of 803,075 NSNs or 72 percent of the NSNs that the DLA Aviation Demand Chain supports (803,075/1,110,362). The 8,094 NSNs make up 1 percent of the 803,075 NSNs that comprise the seven critical FSGs, a relatively small number. The significance of the analysis of the hypothesis will be further explored in Section H, Assessment.

Table 6-7. Critical FSG Continuity

FSG	FSG Title	June 2013		Dec. 2012		June 2012		Dec. 2011		June 2011	
		Pos.	No. B/O NSNs	Pos.	No. B/O NSNs	Pos.	No. B/O NSNs	Pos.	No. B/O NSNs	Pos.	No. B/O NSNs
15	Aircraft and Acft Structural Comp.	1	1,091	3	616	2	716	2	1,045	2	828
16	Aircraft Comp. and Accessories	3	804	4	391	4	484	4	605	5	520
31	Bearings	5	487	7	277	7	316	8	417	8	336
53	Hardware and Abrasives	2	878	1	1,016	1	1,271	1	1,694	1	1,458
59	Electrical and Electronic Equip. Components	4	540	2	711	3	692	3	1,040	3	825
61	Electric Wire, and Power and Distribution Equip.	7	345	5	329	5	445	6	510	6	384
68	Chemical and Chemical Products	6	448	6	281	6	318	10	295	7	370

2. Holistic Characteristics of Long Term Backorder NSNs

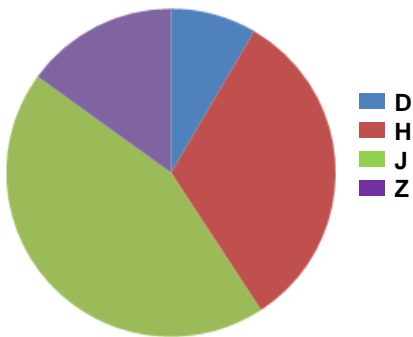
With the completion of the analysis of the hypothesis, the Level 8 set of NSNs will now be characterized using holistic characteristics or variables. The holistic variables in question are those listed in Table 6-2. For this portion of the analysis, the backorder report for 24 June 2013 was used and it is assumed to be representative of the previous 2.5 years.

The first holistic variable of interest is the Acquisition Advice Code. Figure 6-3 shows the distribution of NSNs by AAC. Specifically, it shows the distribution of long term backorders in terms of stockage and non-stockage items. It is both significant and positive that the smallest contributor to the long term backorder problem is demand-based stockage items (legend item D). It is also important to note that non-stocked, centrally procured items (legend item J) constitute a bigger portion of the long term backorder problem than do direct-delivery-under-central-contract items (legend item H)⁶. This indicates it may be desirable to decrease the number of non-stocked, centrally procured items by converting them to direct-delivery-under-central-contract items which should reduce the numbers of long term backorders. This conversion dramatically reduces procurement lead times as direct-delivery-under-central-

⁶ Acquisition advice code H, direct-delivery-under-central-contract items, are a category of which DLA aviation has contracted with suppliers to manufacture or procure, to have readily available, and to issue directly to the items' requisitioners in accordance with DLA guidance.

contract items are placed on contract prior to receipt of demands for those items. That is not the case with not stocked, centrally procured items.

**FSC Analysis: Unique, Critical Backordered NSNs:
Acquisition Advice Code for June 24, 2013**



D - Integrated Managed, Stocked, and Issued (DLA stocks and issues these items.)
H - Direct Delivery Under a Central Contract (Vendors stocks and issues these items for DLA.)
J - Not Stocked, Centrally Procured (DLA procures and issues these items as required. DLA does not stock these items.)
Z - Insurance Item/NSO (DLA stocks and issues these items.)

Figure 6-3. Long Term Backorder AAC Data

The next holistic variable of interest is the Requisition Transaction Status Code (Supply Code). Figure 6-4 shows that practically all of the long term backorders have been procured and are scheduled for direct delivery to the consignees. This is highly desirable and indicates sound planning by DLA Aviation.

**FSC Analysis: Unique, Critical Backordered NSNs: Requisition
Transaction Status for June 24, 2013**

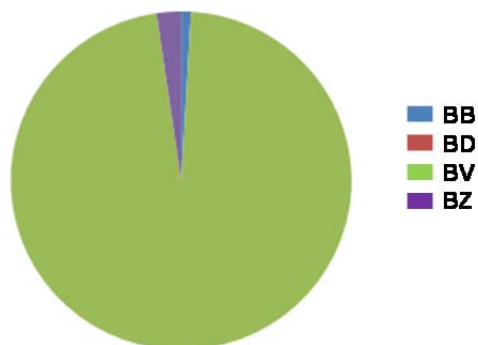


Figure 6-4. Long Term Backorder Supply Status Data

BB - Item backordered against a due-in to stock.

BD - Request is delayed due to need to verify requirements relative to authorized application, item identification, or technical data.

BV - Item procured and on contract for direct shipment to consignee.

BZ - Requisition is being processed for direct delivery procurement.

The relationship between procurement instruments and the number of NSNs being procured is important. Figure 6-5 shows that DLA Aviation issued 1,628 contracts, i.e., PIINs, to purchase 3,581 different NSNs assigned to Level 8 in Table 6-3. In some cases, there were multiple contracts issued for the same NSN due to distribution of demands over the time examined. Overall, the ratio of long term backordered NSNs to contracts is $3581/1628 = 2.2$ to 1 a very small ratio. To significantly reduce backorders, a ratio of at least 10 or 20 to 1 is necessary.⁷ These improved ratios need to be supplemented by using indefinite delivery type contracts, i.e., multiple deliveries per contract.

⁷ Using the data in Figure 6-5, a ratio of 10 to 1 will reduce the number of contracts from 1,628 to approximately 360 long term contracts. These NSNs, if placed on long term contracts, will very likely prevent them from becoming long term backorders for the duration of their long term contract. If so, this would eliminate 90 percent of future long term backorders for those NSNs on long term contract. This is a significant reduction in backorders.

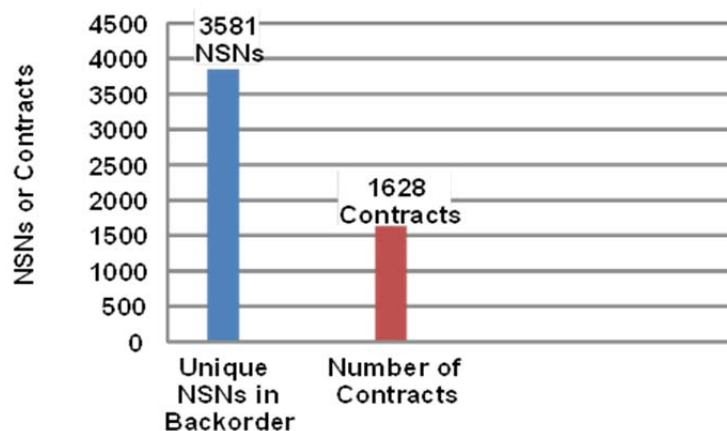


Figure 6-5. Number of Contracts (PIINs) – Backorder Relationship

A further examination of the PIINs yields additional insights. Specifically, position 9 of a PIIN identifies the type of procurement instrument associated with the PIIN; the instrument type is identified by an alpha character. Table 6-8, in a summary manner, identifies the instrument types associated with the NSNs listed on five DLA Aviation backorder reports covering a 2.5-year period. In order to capture all such procurements, the PIINs associated with all unique and non-unique NSNs were utilized.

The most frequently employed types of contracts are indefinite delivery contracts, basic ordering agreements, and purchase orders-manual. The use of indefinite delivery contracts has been increasing over time and is a positive trend. This also implies that a significant number of the 8,094 Level 10 NSNs identified in Table 6-3 are possibly being procured using indefinite delivery type contracts. Figure 6-3, legend item H, implies that about 64 percent of the non-stockage, long term backordered NSNs are being procured using this type of contract. That is a significant number of indefinite delivery type contracts but their contribution to long term backorders is a matter of concern. This concern will be addressed in the assessment in Section G.

Table 6-8. Procurement Instrument Types for Long Term Backordered NSNs

Instrument Type	Jun-11		Dec-11		Jun-12		Dec-12		Jun-13	
	Qty.	%	Qty.	%	Qty.	%	Qty.	%	Qty.	%
A: Blanket purchase agreement	111	0.48	188	0.78	7	0.07	5	0.05	6	0.05
C: Contracts all types except indefinite delivery contracts, etc.	30	0.13	32	0.13	14	0.13	10	0.11	11	0.09
D: Indefinite delivery contracts	17,134	74.36	15,291	63.38	6,622	63.75	6120	66.41	7,203	56.03
E: Reserved		0.00	2	0.01		0.00		0.00		0.00
F: Call for blanket purchase agreements, etc.	5	0.02	14	0.06	9	0.09	8	0.09	4	0.03
G: Basic ordering agreement	1,453	6.31	2,568	10.64	796	7.66	715	7.76	1,721	13.39
L: Lease agreements		0.00	1	0.00		0.00		0.00		0.00
M: Purchase orders –manual	3,961	17.19	5,564	23.06	2,752	26.49	2261	24.54	3,859	30.02
P: Purchase orders-automated	2	0.01	47	0.19	2	0.02		0.00		0.00
R: Request for proposal		0.00		0.00	1	0.01	1	0.01		0.00
V: Purchase orders-automated	340	1.48	400	1.66	182	1.75	95	1.03	49	0.38
W: Purchase orders –manual	5	0.02	18	0.07	2	0.02		0.00	1	0.01
Total	23,041	100	24,125	100	10,387	100	9215	100	12,856	100

First Article Test is the next holistic variable of interest. Figure 6-6 shows that almost 15 percent of the long term backorders required FATs. Since the average length of time to perform and evaluate a contractor first article test is 342 days and 409 days for Government first article tests, this guarantees that most all non-stockage items that require first article testing will result in long term backorders.⁸ The two options open to DLA Aviation to improve this situation are (1) either significantly reduce the number of items that require first article testing or (2) convert all NSNs that require first article testing to stockage items with significantly enhanced stockage levels.

⁸ An analysis of 10,336 first article tests revealed that 89 percent required more than 181 days to be completed. That percentage becomes greater than 98 percent when production times are considered in addition to first article testing times.

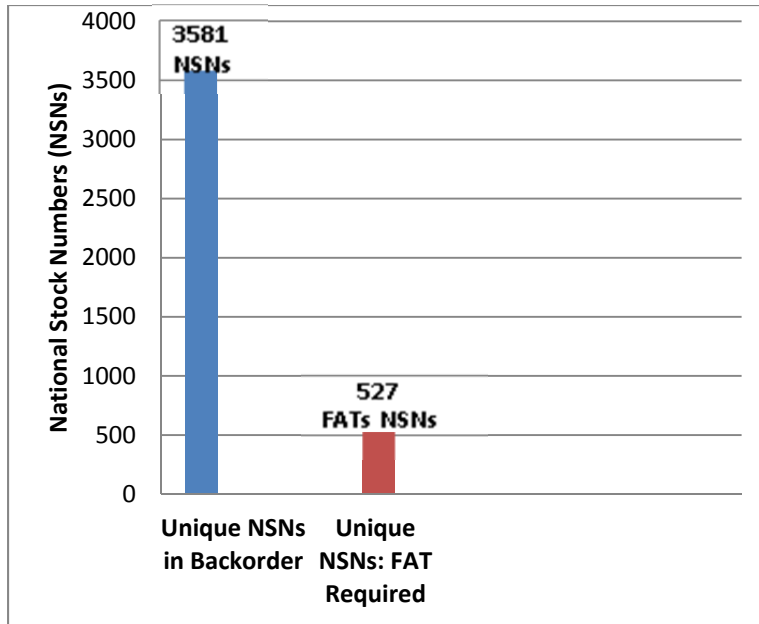


Figure 6-6. First Article Test – Backorder Relationship

Weapon systems are the last holistic variable to be addressed in this section. The Weapon System Designator Code, a unique code assigned to each weapon system, was used to establish a WSDC–NSN relationship. This analysis examined the relationship for a representative federal stock class. FSC 1560, Aircraft Structural Components, was the selected FSC since it contains the largest number of long term backorders. Figure 6-7 shows that 60 percent of all backordered NSNs are associated with seven aircraft types and also shows the density of backordered NSNs. The other 40 percent of backorders are associated with 51 aircraft types. The implication of this weapon system data is that the technical specification for weapon system-related NSNs, in many cases, must be considered when grouping NSNs for procurement. That is, any grouping of NSNs by FSC for procurement may possibly have to be segmented by selected weapon system in some cases.

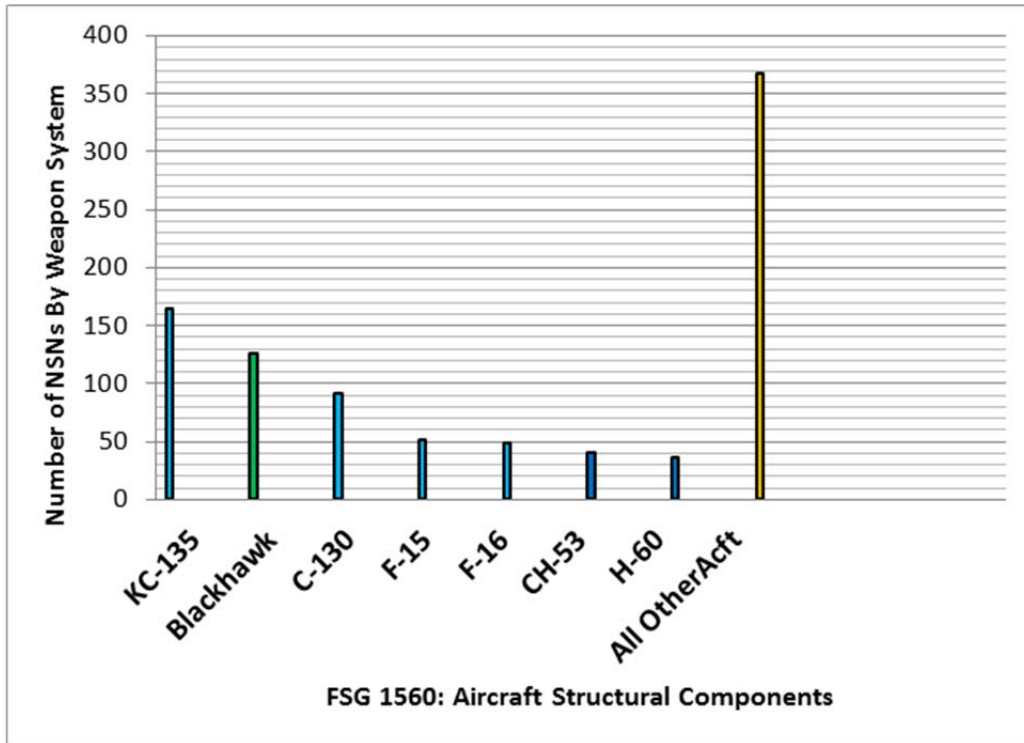


Figure 6-7. WSDC – Backorder Relationship

E. Analysis: Reducing the Technical–Quality Processing Time for Manual Procurements

This analysis focused on only one of the entries in Table 6-1, Critical Application Items. It builds on the discussion of CAIs in Chapter 3, Sections B-11 and B-12. Figure 6-8 shows that 42 percent of DLA Aviation long term backorders are for CAIs. CAIs frequently require DLA to request engineering support services from the cognizant ESA(s). The average ALT for manual contracts that do not require engineering support is approximately 101 days. This increases to approximately 206⁹ days when DLA requests the ESAs to provide engineering support. Hence, the number of long term backorders can be reduced significantly by reducing the number of consumable items that are classified as CAIs.

But what is the cost in terms of quality to reducing the number of CAIs? (See Chapter 3, Section B-7.) A CAI is defined in DLAI 3200.1, *Joint Engineering Support Instruction*, as follows:

⁹ These data come from IDA Paper P-4202, *Analysis of the Joint Engineering Support System and Its Contribution to the DoD Supply Chain*, May 2007.

An item that is essential to weapon system performance or operation, or the preservation of life or safety of operational personnel, as determined by the cognizant engineering activity(s).

Consider only those items that are classified as CAIs because they impact a weapon system's performance or operation. This information is of little value to DLA when procuring those items since essential operational performance requirements have little or no relevant impact on the product descriptions used to procure weapon system consumable items. This is because there is no close relationship between operational criteria and difficulty in manufacturing. As part of the procurement process, DLA needs to have an effective quality control and quality assurance program designed to ensure difficult to manufacture items conform to the product's technical specifications. The important information that DLA would require is knowledge of those items with critical features that are difficult to produce. By definition, CAIs do not provide that information. Therefore, utilizing CAIs during procurement has little or no relevant impact on the quality of the product being procured.

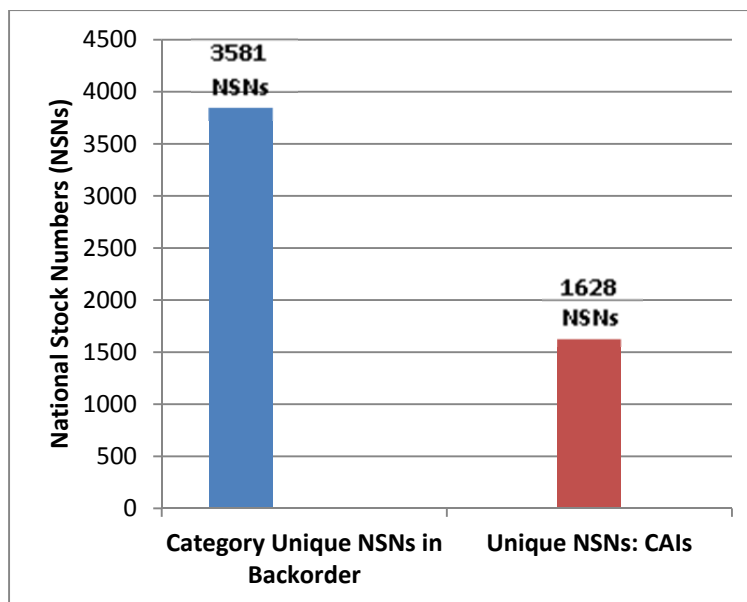


Figure 6-8. Critical Application Items – Backorder Relationship

F. Analysis: Organic Manufacturing

The backorder subtask identified organic manufacturing as a holistic characteristic that may have a significant impact on DLA Aviation's backorders. Per the sponsor's guidance, this section will examine one aspect of this issue, the [Army] Arsenal Act and its impact on Army organic manufacturing and DLA Aviation.

The U.S. Army owns, and in some cases operates, 23 industrial facilities employing approximately 20,000 people. These 23 industrial facilities are geographically dispersed and consist of government ammunition plants, manufacturing arsenals, and maintenance depots. The manufacturing arsenals, Pine Bluff Arsenal, Rock Island Arsenal, and Watervliet Arsenal are potential DLA suppliers of consumable items. These arsenals are governed, in a general way, by the Arsenal Act.

The Arsenal Act is set forth in U.S.C. Title 10, Subtitle B, Part IV, Chapter 433, and Section 4532 and consists of just 56 words.

- a. The Secretary of the Army shall have supplies needed for the Department of the Army made in factories or arsenals owned by the United States, so far as factories or arsenals can make those supplies on an economical basis.
- b. The Secretary [of the Army] may abolish any United States arsenal that he considers unnecessary.

A number of factors bear upon the interpretation of the Arsenal Act. These include the history of the Arsenal Act which goes back to 1854, AR 700-90, *Army Industrial Base Process*, and the Federal Acquisition Regulations.

In 1794, Congress granted President George Washington the authority to establish national arsenals to arm the United States Army with domestically produced weapons. In 1853, Congress gave the Secretary of War (the predecessor to the Secretary of the Army) the authority to abolish any arsenal that he deemed to be unnecessary.¹⁰ However, the portion of the Arsenal Act that is relevant to this analysis is Section (a) since it governs manufacturing of supplies. This section is partially a byproduct of the World War I mobilization effort. The mobilization effort was badly orchestrated by the Army's Ordnance Department (weapons manufacturing),¹¹ which resulted in problems that persisted well after the November 1918 Armistice, i.e., cancellation of contracts, contraction of defense industries, etc. These and other related problems influenced Congress and they acted. Specifically, the impact of both the nation's rapid, mid-19th century industrialization and the post-World War I contraction of the defense industrial base were captured in what is now the Arsenal Act, Section (a).¹²

However neither the Arsenal Act nor its legislative history addressed the issue of "needed Army supplies." This issue is, however, addressed in AR 700-90, *Army Industrial Base Process*, Section 3-7, dated January 2014.

¹⁰ Daniel H. Else, *The Arsenal Act: Context and Legislative History*, Congressional Research Service, 2011, page 1.

¹¹ Ibid, page 5.

¹² Ibid, page 6.

The Secretary of the Army shall have supplies needed for the [Department of the Army] DA made in factories or arsenals owned by the United States, *so far as those factories or arsenals can make those supplies on an economical basis.* Section 4532 does not define the term “supplies.” The definition of “supplies” for Title 10 is found in 10 U.S.C. 101(a)(14). It states that, the term “supplies” includes material, equipment, and stores of all kinds. However, due to the extremely wide variety of “supplies” that the Army uses in the full spectrum of its operations, it is clear that the arsenals cannot provide absolutely all of the “materials, equipment, and stores of all kinds.” The scope of the “supplies” that the arsenals can manufacture is limited to those they have the capability (sufficiently equipped and staffed) of manufacturing and the supplies to be produced must be consistent with the general capabilities of the arsenal and/or factory.

AR 700-90, Section 2-1 addresses items of “supply” for which DLA Aviation is the supply chain manager.

The PEOs and PMs will assess the ability of the industrial base to support the life cycle requirements for assigned programs. Ensure an ICA [Industrial Capabilities Assessment] is conducted when a potential problem exists. This includes collaboration with DLA or other military departments who have a requirement for an item, component or system managed by the Army PM. *For production requirements, rely on the private sector to the maximum extent possible unless Army-owned production facilities are more economical.*

Regarding the economic impact of using Army-owned production facilities to produce an item, component, or system, PEOs and PMs will perform a *make or buy analysis* under the authority of 10 U.S.C. 4532.

Since the Arsenal Act is a Federal statute, it selectively impacts DLA Aviation operations. Since the Secretary of the Army is responsible for the implementation of the Arsenal Act, those aspects of AR 700-90 that address implementation of the Arsenal Act are selectively applicable to DLA Aviation. Since AR 700-90 guidance requires the Army to rely on the private sector to the maximum extent possible unless Army-owned production facilities are more economical, it is the Army’s responsibility to perform economic assessments. That is, the Army is responsible for determining when it is economical for the arsenals to manufacture supplies for the Army.

G. Assessment: Reducing the Number of Manual Procurements

The purpose of the Section D analysis was to determine if it were possible using historical data to find a small set of holistic characteristics—critical characteristics—common to a large number of backorders that will permit subsequent demands for those items to be collectively managed in a way that will reduce the impact of future

backorders. To determine if this was possible a hypothesis was proposed and evaluated. The results of the evaluation showed that DLA Aviation's long term backorders were associated with 4,815 NSNs and that 2,741 of those NSNs belonged to one of 13 critical FSCs; that is, 60 percent of the backordered NSNs were associated with those 13 critical FSCs. The analysis further showed that this rational remained valid when analyzing backorder reports for the past 2.5 years. In summary, the hypothesis was validated. To apply the hypothesis to future procurement actions, the long term backordered NSNs associated with the 13 critical FSCs should be grouped by FSCs. Each group should consist of 10-20 NSNs in order to be manageable.

Table 6-9. Time Distribution of Critical, Non-Stockage, Unique, Backordered NSNs

Time Dist. Cat.	Number of Backordered NSNs by Distribution Category and by FSC													
	1560	1610	1615	1650	1680	3110	3120	5340	5342	5365	5995	6150	6850	Cum SUM
1	1837	2	48	103	281	468	559	93	279	1030	669	800	23	8,094
2	213	2	2	24	61	109	108	32	50	159	153	151	5	1,902
3	129	0	5	18	30	31	42	10	24	52	37	57	4	833
4	80	0	3	5	9	19	16	3	5	21	26	31	0	394
5	86	0	0	3	13	9	4	2	5	12	12	30	0	176
Total	2345	4	58	153	394	636	729	140	363	1274	897	1069	32	N/A

The analysis of several of the holistic variables identified a number of factors that will impact the grouping of long term backordered NSNs. As Figure 6-5 shows, these NSNs are not often grouped and as a consequence the technical-quality workload is very burdensome. If these NSNs were grouped 20 NSNs per procurement action, the ALT associated with procuring those NSNs would be reduced by approximately 95 percent compared to the current non-grouped procurement practices. If the average ALT for manually processed procurements is 150 days then up to 2,800 ALT days would be saved annually for each 20-NSN grouping, once the indefinite delivery contracts were in place, since there would be fewer contracts. The actual size of the groupings will depend on the industrial base associated with each FSC and considerations of the technical requirements associated with major weapon systems. The discussion of PIINs associated with Table 6-8 concluded that approximately 64 percent of PIINs associated with long term backordered NSNs were being procured using indefinite delivery type contracts; this is a large, undesirable percentage. The estimated 64 percent of long term backordered NSNs being procured using indefinite delivery type contracts may indicate those contracts do not contain desirable time-to-deliver standards that the contractors must satisfy. Table 6-9 may be useful in establishing those time-to-deliver standards when grouping NSNs for procurements.¹³ Column one indicates the level of activity, i.e., "hits," that occurred over each of the five 6-month periods; five being the highest level of activity; in each of the

¹³ The table aggregates for backordered NSNs the extent of requisition activity in each of the five 6-month periods being evaluated. For example, if an NSN had six requisitions listed in the December 2013 backorder report and one requisition in the June 2014 report this would be recorded as two "hits".

five time periods. This provides a basis for establishing time-to-deliver standards for grouped contracts either by NSN or by FSC.

First article tests, due to their adverse impact on PLTs, will almost always result in the tested NSNs becoming long term backorders. This assessment will be expanded upon in the next section.

H. Assessment: Reducing the Technical–Quality Processing Time for Manual Procurements

The analysis, in this chapter, in support of reducing the technical-quality processing time for manual procurements focused on CAIs and the role they play in procurements. This role is fundamentally negative since they increase the administrative workloads, resulting in increased ALTs; CAIs contribute very little to improving the quality of the product. CAIs need to be transformed into a positive force for providing better support for DLA Aviation’s customers. The analysis and recommendations in Chapter 3, Section B-11 and B-12, address the CAI issue in detail and contain recommendations on how to improve the situation. It suffices for this assessment to conclude that the negative impact on CAI procurements must be reduced or eliminated if the ALTs for manual procurements are to improve significantly. As the number of CAIs is reduced the number of automated contracts will increase, which will help reduce long backorders.

The analyses and assessments of first article tests and technical data package reviews are not included in Chapter 6 since they were addressed separately in Chapters 4 and 5 respectively. Those analyses and assessments, like that of CAIs, demonstrate that the way that they are being utilized increases the ALTs and PLTs associated with manual procurements without significantly improving the quality of the products. This situation needs to be rectified to reduce the ALTs and PLTs associated with manual procurements.

I. Assessment: Organic Manufacturing

The Arsenal Act and AR 700-90 impacts DLA Aviation’s item management responsibilities. Specifically, if the Army designates an arsenal as a “directed” source, DLA is to order from them to satisfy Army requirements.

J. Conclusions

A twofold approach was taken in this chapter to satisfy the backorder subtask requirements to (1) significantly reduce both the costs and procurement times associated with backorders, and (2) significantly reduce both the costs and administrative lead times that are required to process manual procurements:

- First, reduce the total number of manual procurements required to satisfy DLA Aviation Supply Chain requirements.

- Second, identify policies and procedures that will permit manual procurements to be processed in a more expedient manner.

This chapter's analyses and assessments led to the following conclusions:

- Reducing the number of manual contracts processed by DLA Aviation by grouping selected NSNs by their Federal Stock Classes and procuring them using long term delivery type contracts will result in significant time and cost savings and improved customer support.
- The technical-quality processing times associated with manual procurements can be significantly reduced by:
 - Restructuring the critical application item process to include the use of Federal Logistics Information System criticality codes (see Chapter 3)
 - Dramatically reducing the number of first article tests performed (see Chapter 4)
 - Significantly reducing the number of technical data package reviews (see Chapter 5).

In order to realize these costs and time savings it will first be necessary to replace DLAI 3200.1, *Joint Engineering Support Instruction*, with a new more customer-focused DoDI. (See Chapter 3 Section B-11 and B-12) DLAI 3200.1's decentralized management construct and restrictive procurement practices requires the cognizant Engineering Support Activity's approval, for each affected NSN, when any of the following contractual actions will occur: (1) insertion of Contract *Quality* Requirements, (2) insertion of testing requirements, and (3) waiver of first article testing or production lot testing. A similar situation exists regarding technical data packages. DLAI 3200.1 requires TDP development or revalidation be performed in accordance with the military services' requirements.

K. Recommendations

Recommendation 1. Implement a contracting strategy based on *critical* Federal Stock Classes, which will reduce the number of manual contracts by approximately 85 percent:

- Employs a small number of contracts to procure a significant number of NSNs assigned to each *critical* Federal Stock Class. Perform this action by grouping selected NSNs assigned to the *critical* Federal Stock Classes for procurement.
- Considers weapon-specific technical requirements when determining grouping NSNs for procurements
- Increases the utilization of indefinite delivery type of long term contracts.

Recommendation 2. The contracting strategy goal should be one contract for every 20 unfilled orders/requisitions for those selected NSNs assigned to *critical* Federal Stock Classes.

Recommendation 3. Critical Application Items; see Chapter 3, Section B-12.

Recommendation 4. First Article Tests; see Chapter 4, Section G.

Recommendation 5. Technical Data Packages; see Chapter 5, Section E.

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Appendix A

Extract: DMRD 926 Study Approval Memorandum & Executive Summary



THE DEPUTY SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

July 3, 1990

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
ASSISTANT SECRETARIES OF DEFENSE
COMPTROLLER
GENERAL COUNSEL
INSPECTOR GENERAL
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTORS OF THE DEFENSE AGENCIES

SUBJECT: DMRD 926 Inventory Control Point Consolidation Study Report

The attached report was prepared by a joint OSD/Component study team, charged with reviewing the potential for consolidating Inventory Control Point (ICP) activities. I am approving the report recommendations, to include the following major actions:

- Transfer item management responsibility for approximately one million consumable items from the Military Services to the Defense Logistics Agency;
- Direct the Army to develop a plan to realign and consolidate its ICPS to reduce overhead costs, while maintaining responsive and effective logistics support to its operating forces;
- Continue Service management of reparable items, subject to a future reassessment of consolidation and increased interservice integration, as the necessary ADP systems, policies, and support infrastructure are developed; and
- Consolidate cataloging functions.

The Assistant Secretary of Defense for Production and Logistics will oversee implementation and provide me with progress reports. Your continued effort and support are deeply appreciated. These improvements will reduce costs significantly while preserving our readiness and sustainability.

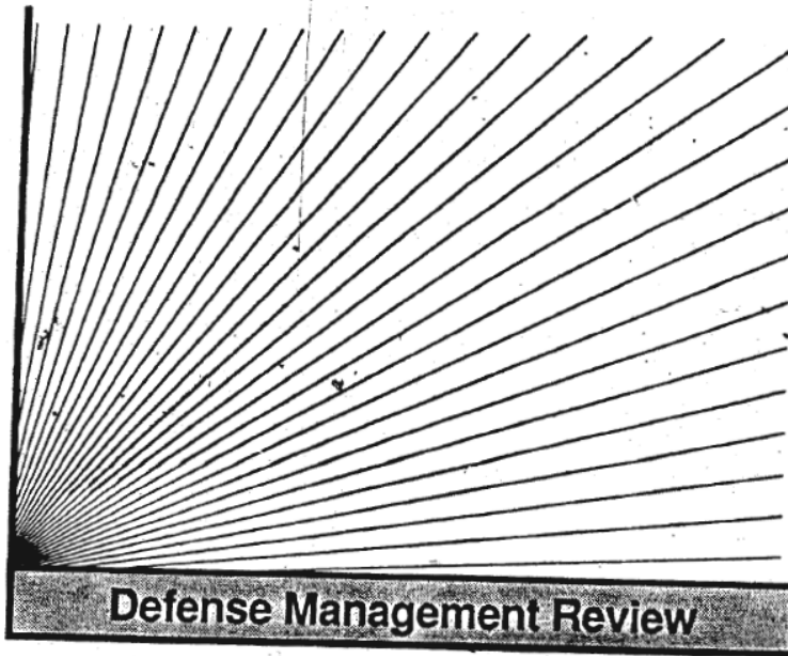
J. A. Atwood

Attachment

12142



ICP Consolidation Study



Under Secretary of Defense
(Acquisition)
May 1990

Executive Summary

Background. On November 11, 1989, the Deputy Secretary of Defense directed the OSD staff to review selected Defense Management Report Decisions (DMRD), and where applicable, develop detailed implementation plans. One of the DMRDs encompassed in this review was DMRD 926, "Consolidation of Inventory Control Points (ICPs)."

Discussion. DMRD 926 recommended that:

- The Services transfer management responsibility for all consumable items to the Defense Logistics Agency (DLA) over a three year period, thereby resulting in estimated savings of \$319 Million and 10,624 workyears during Fiscal Years (FY) 1991-1995;
- Each Service consolidate the number of ICPs within its own Service; and
- All ICPs can be consolidated within a single Service or DLA, and item management may be further realigned to a commodity orientation, e.g., all aviation items to be managed by a single activity.

Approach. A Joint OSD/Component Study Team was formed to address the DMRD. The Study Team held regular meetings to discuss all facets of ICP consolidations and collected extensive information on the current organization and operation of DoD ICPs. Subgroups were formed to address specific target areas. The resulting subgroup reports were analyzed, along with appropriate field research and open discussions with all Study Team participants to reach the conclusions shown below.

Conclusions.

- **Transfer Consumable Items to DLA**
 - » The transfer of 981 thousand Service-managed consumable items to DLA is both cost effective and desirable;
 - » The remaining Service-managed consumable items requiring special management attention will be retained by the Services pending validation of rationale for continued Service management, development of new filter criteria, and the application of that criteria;
 - » The savings from the transfer would produce an estimated recurring annual savings in the range of \$45 million to \$49 million (FY 1989 dollars) beginning in FY 1995; and
 - » All savings are derived from 1989 baseline data and do not consider the impact of approved or proposed Service reductions in the outyear programs.

● **Intraservice Consolidation of ICPs**

- » The potential exists to achieve major savings from reducing the number of Army ICPs;
- » The Army has initiated action to reduce its ICPs from six to five, by closing Troop Support Command, which will generate an estimated \$25 million in annual recurring savings;
- » The optimum number of ICPs must be determined by the Army, taking fully into account a number of noneconomic factors; and
- » The consolidation of IMM functions within the Air Force, without reducing the number of ALCs, is not a cost effective decision.

● **Single Service/Agency Management of all ICPs**

- » The DMRD proposal to achieve major overhead reductions by transferring management of reparable items to a single Service or Agency is not feasible and appears to affect weapon systems management, unless and until significant ADP system improvements are designed, developed and implemented;
- » Continued Service management of reparables is therefore necessary to achieve weapon systems management objectives; and
- » Almost all of the savings which could be derived from the DMRD alternative can be achieved if the recommendations in this report are carried out and an ICP Corporate Information Management (CIM) System is developed.

● **Other Consolidation Opportunities**

- » There are key areas with potential consolidation savings including cryptography, metrology and forms and publications management, but all require specialized study;
- » Cataloging consolidation is feasible and desirable;
- » The cataloging option recommended, which provides for optimum centralization of Service cataloging activities and transfer of specific tasks to DLA, will produce recurring annual savings of \$37.8 million after FY 1995.

Recommendations.

A summary of the major recommendations contained in the report is provided below. Each recommendation is keyed to the appropriate page number of the report where a further discussion is provided.

- Approve the Phase 1 transfer of 981 thousand consumable items to DLA and the supporting implementation plan contained in Appendix G. (Requires an upfront investment and provision to compensate losing stock funds; savings have to be adjusted for impact of other DMRDs which apply to the same resources in the outyears.) (Page 17)
- Approve the Phase 2 proposal to validate the Service rationale for retaining Category 2 items, develop revised criteria, where appropriate, and apply the criteria to Category 2 items. (Page 17)
- Assign the responsibility for developing a plan to accomplish Phase 2 to the ASD (Production and Logistics). (Page 17)
- Request the OSD (Comptroller) to prepare a stock fund cash balancing plan to offset Service cash losses resulting from the mass migration of Category 1 consumable items and recognize these offsets during the stock fund budget process. (Page 18)
- Request the Secretary of the Army to initiate a detailed internal review aimed at determining the optimum number of Army ICPs necessary to effectively support its operating forces while reducing its overhead to a minimum. (Page 25)
- Request the Army to submit the results of its review to the Undersecretary of Defense (Acquisition) by December 31, 1990, to include a time-phased action plan outlining steps that will be taken to achieve further consolidation of ICPs, where warranted. (Page 25)
- Disapprove any consolidation of Air Force ICP functions at this time, unless a decision is made as a result of other DMRD actions to consolidate or reduce the number of Air Force maintenance or distribution sites. (Page 26)
- Disapprove the DMRD proposal to establish a single Service or Agency manager of ICPs. Other recommendations made by the ICP Consolidation Study Team in this report provide an alternative, preferred approach to achieving the overhead reductions and savings envisioned by the DMRD. (Page 28)
- Reaffirm DoD's commitment to weapon system management principles through continued Service management of reparable items. (Page 28)

ICP Consolidation Study

- Request the Director, National Security Agency, to chair a joint study with DoD to determine the most cost effective means of providing logistics support for cryptographic materiel, consistent with National Security requirements. It is further recommended that, to the extent practicable, DoD MILCON efforts in the cryptography area be suspended pending the study outcome. (Page 31)
- Approve the centralization of Service cataloging functions and the transfer of Item Identification and Cataloging Tool tasks to DLA, consistent with Option 2 developed by the ICP Study Team. (Page 34)

Minority Positions.

While every effort has been made to accommodate all viewpoints, some areas of disagreement remain. Minority positions are included at the end of the report (pages 40 through 49) to ensure that these viewpoints are fully considered in the decision process. Service and Agency comments address specific points of contention.

Appendix B

Extract: DMRD 926 ICP Consolidation Study Report

A. ICP Definition

The [DMRD 926] Study Team found that there was no commonly accepted definition of an ICP within DoD. Because of the differences in operating philosophies and organizational structures used by the Services and DLA, it was difficult to equate ICP activities across Component lines. Since the full range of ICP functions was not always performed at each ICP, the Operations Subgroup spent considerable time developing a definition of an ICP that could universally be used in the study.

The group defined 18 Integrated Materiel Management (IMM) functions, consisting of approximately 170 tasks that constituted a “notional” ICP for purposes of the study. A DoD activity performing any of these functions and tasks at the wholesale level was deemed to be within the scope of the study. The functions and tasks are provided as an attachment to the group’s data call which is contained in [an appendix to that study¹]. These functional definitions were also provided to the OSD Comptroller for the Unit Cost initiative and to the Corporate Information Management Materiel Management Team for their use.

¹ The appendices to the DMRD 926 study are no longer attached to the DTIC copy of the study.

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Appendix C

Consolidated List of Study Recommendations

This appendix reproduces the complete set of recommendations contained in Chapters 3–6. Section A contains the Chapter 3, Root-Cause Analyses, recommendations and in a similar manner Chapter 4-6 recommendations are to be found in Sections B-D.

A. Root-Cause Recommendations

Recommendation 1. Redraft DoDD 5105.22, *Defense Logistics Agency*, to explicitly include IMM as one of the responsibilities and functions assigned to the Director, DLA for execution.

Recommendation 2. DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled and not reissued.

Recommendation 3. DUSD(L&MR) should develop and issue a DoDI that addresses IMM, the joint engineering support system, and the procurement management of DLRs.

Recommendation 4. Utilize the FAR guidance as it applies to technical-quality operations, e.g., first article tests.

Recommendation 5. Cease relying on CAIs to support supply chain operations.

Recommendation 6. Utilize FLIS Criticality Codes to establish the appropriate level of quality control requirements to impose on solicitations.

B. First Article Testing Recommendations

The following recommendations are designed to implement the *build in quality* construct. They are also intended to significantly reduce the number of first article tests DLA Aviation is required to perform. The impact of implementing these recommendations will be an increase in the numbers of consumable items being procured that conform to their technical specifications, significantly decreasing procurement lead times, and reducing testing and stockage costs.

Recommendation 1: Implement an aggressive quality control program that conforms to FAR Subpart 46.2, Contract Quality Requirements:

- DLA should cancel DLAI 3200.1, *Joint Engineering Support Instruction*.

- DLA Aviation should assign contract quality requirements to all solicitations for items possessing a Weapon System Designator Code (WSDC).
- DLA Aviation should assign higher-level contract quality requirements and standard inspection requirements to all solicitations for items classified as CAIs, SPCs, or requiring a first article test; assign the appropriate QCCs.
- The definition of selected QCCs should be modified to include Production Lot Testing (PLT) along with Product Verification Testing (PVT).
- Assigning QCCs should become a semi-automated process. See Section H, below, for details.

Recommendation 2: Implement a more comprehensive Government Contract Quality Assurance (GCQA) program for critical items. This GCQA program is to conform to FAR Subpart 46.4, *Government Contract Quality Assurance*, and DFARS Subpart 246.4, *Government Contract Quality Assurance*.

- DLA Aviation should task the DCMA to perform in-plant surveillance to include production surveillance and quality assurance support for all CAIs, SPCs, and first article test items.
- DLA should develop a new “Memorandum of Understanding between DLA and DCMA” effective FY 2015. It should facilitate, for CAIs, SPCs, and first article test items, DCMA performing in-plant surveillance to include production surveillance and quality assurance support.
- DCMA should routinely be delegated the authority to have PLT and/or PVT performed when they are providing GCQA and they deem it to be necessary.

Recommendation 3: Significantly reduce the number of first article tests being performed. The first article test program should conform to FAR Subpart 9.3, *First Article Testing and Approval*, and DTM 13-007, *DLA First Article Requirements and Process Management*.

- Technical-Quality personnel should only approve the performance of first article testing that is authorized by FAR Section 9.303. In exceptional cases supervisors may waive that FAR Section 9.303 compliance.
- EBS should be modified to automatically remove the “Y” indicator from the first article test indicator fields in the NSNs material master 120 days after it was entered (see Section H).
- All requests to perform first article testing should be pre-screened using the AMC/AMSC matrix described in Sections D-8 and H. Requests for first article testing that do not meet the AMC/AMSC matrix criteria should be returned unless the request contains detailed justification.

- First article testing procedures, contained in DTM 13-007, should continue to be used to supplement and expand on FAR Subpart 9.3 guidance.
- DLA Aviation should take command actions to facilitate the effective implementation of DTM 13-007, *DLA First Article Requirements and Process Management*.

C. TDP Recommendations

Recommendation 1. Have the military service ESAs “push” technical data changes to DLA as changes occur.

- This includes TDP changes that affect form, fit, function, or interface, or other changes that impact the ability of a manufacturer to produce an item that meets technical specifications and requirements.
- This recommendation should be codified by including implementation language in a DoD logistics management policy document such as DoDI 4140.01, *DoD Supply Chain Materiel Management Policy*.

Recommendation 2. DLAI 3200.1, *Joint Engineering Support Instruction*, should be cancelled.

- The TDP provisions of the performance-based agreements associated with DLAI 3200.1 should be cancelled. Specifically, the guidance that calls for DLA to request ESA TDP reviews based on calendar time, criticality, and weapon system designator code.
- Base the need for an ESA TDP review on the key **event** that warrants a DLA request for a TDP review. That is, a **change** to the TDP that affects form, fit, function, or interface and thereby would affect the use of the TDP as a product description within a DLA contract.

Recommendation 3. Recommendation 1 will take a period of time to implement. In the interim, request ESA TDP reviews only when it is clear the procurement acquisition strategy, as indicated by the AMC/AMSC Codes, is suitable for using a TDP as the product description.

- Use the AMC/AMSC matrix (Figure 5-3) as a guide to screen and reduce unnecessary ESA TDP reviews.

Recommendation 4. Do not require ESA TDP reviews for procurement when:

- Using a manufacturer’s part number as the product description
- Using military specifications or standards as the product description.

Recommendation 5. The Services should maintain transparency of technical data for DLA.

- The Services maintain technical data repositories for the storage of TDPs. DLA should have access to all military service technical repositories.
- DLA's access to technical data repositories should be all that is required to assure DLA that they are using the latest technical data, thus eliminating the need for unnecessary ESA TDP reviews.

Recommendation 6. TDP policy and procedures that address critical safety items should not be changed based on this paper. CSIs require a higher level of management by all parties to assure that the items produced meet all requirements.

D. Backorder Recommendations

Recommendation 1. Implement a contracting strategy based on *critical* Federal Stock Classes, which will reduce the number of manual contracts by approximately 85 percent:

- Employs a small number of contracts to procure a significant number of NSNs assigned to each *critical* Federal Stock Class. Perform this action by grouping selected NSNs assigned to the *critical* Federal Stock Classes for procurement.
- Considers weapon-specific technical requirements when determining grouping NSNs for procurements
- Increases the utilization of indefinite delivery type of long term contracts.

Recommendation 2. The contracting strategy goal should be one contract for every 20 unfilled orders/requisitions for those selected NSNs assigned to *critical* Federal Stock Classes.

Recommendation 3. Critical Application Items; see Chapter 3, Section B-12.

Recommendation 4. First Article Tests; see Chapter 4, Section G.

Recommendation 5. Technical Data Packages; see Chapter 5, Section E.

Appendix D

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Appendix F

Acronyms and Abbreviations

AAC	Acquisition Advice Code
ACO	Administrative Contracting Officer
ALRE	Air Launch and Recovery Equipment
ALT	Administrative Lead Time
AMC	Acquisition Method Code
AMRDEC	US Army Aviation and Missile Research and Development Center
AMSC	Acquisition Method Suffix Code
AR	Army Regulation
ASD	Assistant Secretary of Defense
ASSIST	Acquisition Streamlining and Standardization Information System
AT&L	Acquisition, Technology & Logistics
BO	Backorder
BRAC	Base Realignment and Closure
BSM	Business Systems Modernization
C&B	Chemical & Biological
C&E	Clothing and Equipment
CAI	Critical Application Item
CAO	Contract Administrative Officer/Office
CDRL	Contract Data Requirements List
CFAT	Contractor First Article Test
CIC	Critical Item Code
CID	Commercial Item Description
CIM	Critical Item Management
CIT	Consumable Item Transfer
CO	Contracting Officer
CoC	Certificate of Conformance
COTS	Commercial Off-The-Shelf
CRM	Customer Relationship Management
CSI	Critical Safety Item
CT&IE	Clothing, Textiles and Individual Equipment
DCMA	Defense Contract Management Agency
DFARS	Defense Federal Acquisition Regulation Supplement
DLA	Defense Logistics Agency

DLAD	Defense Logistics Acquisition Directive
DLAI	DLA Instruction
DLIS	Defense Logistics Information System
DLR	Depot Level Repairable
DMR	Defense Management Report
DMRD	Defense Management Report Decision
DMS	Data Management System
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DORRA	DLA Office of Operations Research and Resource Analysis
DSCP	Defense Supply Center Philadelphia
DTIC	Defense Technical Information Center
DTM	Directive Type Memorandum
DUSD	Deputy Undersecretary of Defense
EBS	Enterprise Business System
ESA	Engineering Support Activity
FA	First Article
FAR	Federal Acquisition Regulation
FAT	First Article Test; First Article Testing
FATA	First Article Testing and Approval
FLIS	Federal Logistics Information System
FSC	Federal Stock Class; Federal Supply Class
FSCAP	Flight Safety/Critical Application Procedure
FSG	Federal Stock Group
FY	Fiscal Year
GCQA	Government Contract Quality Assurance
GFAT	Government First Article Test
ICA	Industrial Capabilities Assessment
ICBM	Intercontinental Ballistic Missile item
ICP	Inventory Control Point
IDA	Institute for Defense Analyses
IM	Item Management
IMM	Integrated Materiel Manager/Management
IRPOD	Individual Repair Parts Ordering Data
ISO	International Standards Organization
ISSL	Initial Supply Support List
JEDMICS	Joint Engineering Data Management Information Control System
JESI	Joint Engineering Support Instruction

L&MR	Logistics & Materiel Readiness
LMI	Logistics Management Institute
LSE	Life Support Equipment
M/TE	Measurement & Test Equipment
MBRT	Manual Bidset Request Tracker
MIL-STD	Military Standard
MILSPEC	Military Specification
NIIN	National Item Identification Number
NSN	National Stock Number
ODUSD	Office of the Deputy Under Secretary of Defense
OEM	Original Equipment Manufacturer
OSD	Office of the Secretary of Defense
OUSD	Office of the Under Secretary of Defense
P/N	Part Number
PBA	Performance Based Agreement
PCO	Procurement Contracting Officer
PDMD	Product Data Management Division
PDS	Product Data Specialist
PEO	Program Executive Officer/Office
PICA	Primary Inventory Control Activity
PIIN	Procurement Instrument Identification Number
PLT	Production Lead Time; Production Lot Test
PM	Program Manager
PMO	Program Management Office
PQDR	Product Quality Deficiency Report
PR	Purchase Request
PS	Product Specialist
PVT	Product Verification Test; Product Verification Testing
QA	Quality Assurance
QALI	Quality Assurance Letter of Instruction
QAP	Quality Assurance Procedure
QC	Quality Control
QCC	Quality Control Code
QM	Quality Management
QPL	Qualified Products list
RSW	Release Strategy Workflow

SECDEF	Secretary of Defense
SICA	Secondary Inventory Control Activity
SOW	Statement of Work
SPC	Special Procedures Category
TDP	Technical Data Package
UFO	Unfilled Order
USG	United States Government
WSDC	Weapon System Designator Code
WSEC	Weapon System Essentiality Code
WSIC	Weapon System Identification Code

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14. ABSTRACT IDA conducted this study in support of the Director Aviation Engineering, Defense Logistics Agency. The objective of the study was to identify ways to significantly reduce the engineering support times and costs associated with first article testing and approval, technical data package reviews, and backordered supply reduction. To perform this study IDA analyzed large amounts of DLA generated and maintained logistics data; approximately 0.3 billion data elements, and reviewed numerous USG, DoD, and DLA policy documents. IDA also interviewed of over 60 DLA Aviation personnel. The study identified several ways to significantly reduce engineering support costs and times in each functional areas analyzed; practically all of the reduction efforts will require the support of senior leaders at Headquarters, DLA and the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics.					
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